



U.S. Department  
of Veterans Affairs

## Project Manual

Edward Hines, Jr. VA Hospital

5000 South 5<sup>th</sup> Avenue, Hines, Illinois 60141

# Install Electrical Service for Radiology Expansion Building 200

Contract No. VA69D-13-C-0324

Station Project No. 578-15-033

Bancroft-AE Project No. 13-126

100% Bid SUBMITTAL

5 December 2015



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**SPECIAL SECTIONS**



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**LIST OF DRAWING SHEETS**

The drawings listed below accompanying this specification form a part of  
the contract.

<u>Drawing No.</u>	<u>Title</u>
<b>GENERAL</b>	
GI001	COVER SHEET
GI002	GENERAL NOTES AND SYMBOLS
GI003	EXISTING UNDERGROUND SITE SURVEY (FOR REFERENCE ONLY)
GI004	PARTIAL ELECTRICAL BASEMENT PLAN WITH EQUIPMENT FOR ALL PHASES (FOR REFERENCE ONLY)
GI005	PARTIAL ELECTRICAL LOWER (STONE) BASEMENT PLAN WITH CONDUIT FOR ALL PHASES (FOR REFERENCE ONLY)
GI006	PARTIAL ELECTRICAL SITE PLAN FOR ALL PHASES (FOR REFERENCE ONLY)
GI007	ISOMETRIC VIEW - ALL PHASES (FOR REFERENCE ONLY)
GI008	ISOMETRIC VIEW - ALL PHASES (FOR REFERENCE ONLY)
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<b>STRUCTURAL</b>	
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SF100	PARTIAL LOWER (STONE) BASEMENT PLAN
SF101	PARTIAL BASEMENT PLAN
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<b>ARCHITECTURAL</b>	
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AS501	ARCHITECTURAL DETAILS
AS502	STAIR DETAILS
<b>ELECTRICAL</b>	
E001	ELECTRICAL SYMBOLS AND ABBREVIATIONS
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E904	ISOMETRIC VIEW

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**DIVISION 01**

**GENERAL REQUIREMENTS**



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**SECTION 01 00 00**  
**GENERAL REQUIREMENTS**

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**GENERAL REQUIREMENTS**

**1.1 SAFETY REQUIREMENTS**

- A. Refer to section 01 35 26, SAFETY REQUIREMENTS for safety and infection control requirements.

**1.2 GENERAL INTENTION**

- A. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for as required by drawings and specifications.
- B. Visits to the site by Bidders may be made only by appointment with the COR.
- C. Offices of Architects +Engineers, as Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.
- D. Before placement and installation of work subject to tests by testing laboratory retained by Department of Veterans Affairs, the Contractor shall notify the COR in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than three work days unless otherwise designated by COR.
- E. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.
- F. Training:
  - 1. All employees of general contractor or subcontractors shall have the 10-hour or 30-hour OSHA Construction Safety course and other relevant competency training, as determined by COR acting as the Construction Safety Officer with input from the facility Construction Safety Committee.
  - 2. Submit training records of all such employees for approval before the start of work.
- G. Prior to commencing work, general contractor shall provide proof that a OSHA designated "competent person" (CP) (29 CFR 1926.20(b)(2) will maintain a presence at the work site whenever the general or subcontractors are present.

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H. VHA Directive 2011-36, Safety and Health during Construction, dated 9/22/2011 in its entirety is made a part of this section.

**1.3 STATEMENT OF BID ITEM(S)**

- A. ITEM I, All Work include general construction, alterations, drainage, necessary removal of existing construction and certain other items.
- B. ITEM II, Electrical Work: Work includes all labor, material, equipment and supervision to perform the required electrical construction work on this project including as indicated in the drawings.
- C. ITEM III, Mechanical Work: Work includes all labor, material, equipment and supervision to perform the required Mechanical construction work on this project including as indicated in the drawings.

**1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR**

- A. Drawings and contract documents may be obtained from the website where the solicitation is posted. Additional copies will be at Contractor's expense,
- B. In the case of conflicts or discrepancies within or among the Contract Drawings, the better quality, more stringent requirements or greater quantity of work, as determined by the Government, shall be provided.

**1.5 CONSTRUCTION SECURITY REQUIREMENTS**

A. Security Plan:

- 1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
- 2. The General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.

B. Security Procedures:

- 1. General Contractor's employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
- 2. Before starting work the General Contractor shall give one week's notice to the Contracting Officer so that security arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.



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3. No photography of VA premises is allowed without written permission of the Contracting Officer.
4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

**C. Key Control:**

1. The General Contractor shall provide duplicate keys and lock combinations to the Contracting officers representative COR for the purpose of security inspections of every area of project including tool boxes and parked machines and take any emergency action.
2. The General Contractor shall turn over all permanent lock cylinders to the VA locksmith for permanent installation. See Section 08 71 00, DOOR HARDWARE and coordinate.

**D. Document Control:**

1. Before starting any work, the General Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
2. The General Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.
3. Certain documents, sketches, videos or photographs and drawings may be marked "Law Enforcement Sensitive" or "Sensitive Unclassified". Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the Contracting Officer upon request.
4. These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.
5. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
6. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".

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7. All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).
  - a. Security, access and maintenance of all project drawings, both scanned and electronic shall be performed and tracked through the EDMS system.
  - b. "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.

**E. Motor Vehicle Restrictions**

1. Vehicle authorization request shall be required for any vehicle entering the site and such request shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies.
2. Separate permits shall be issued for General Contractor and its employees for parking in designated areas only.

**1.6 OPERATIONS AND STORAGE AREAS**

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.
- C. The Contractor shall, under regulations prescribed by the Contracting Officer; use only established roadways, as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect

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them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads. All material, refuse, demo material, shall be transported before 6:00 am and after 5:00 pm daily and weekends. The weekends work only allowed thru project engineer's prior approval. When it is necessary to cross curbs or sidewalks, the contractor shall protect them from damage. Transport route should be approved by the project engineer. The contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads. No on-site storage or field office will be provided. If a trailer will be brought on site, request location for it and get approvals as early as possible.

1. The necessity for materials, equipment and tool storage outside the construction and contract area shall be determined by the Project Engineer.
- D. Working space and space available for storing materials shall be as determined by COR.
- E. Workmen are subject to rules of Medical Center applicable to their conduct.
- F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, between the hours of 6:00 am and 5:00 pm or when 24 hours patient occupancies are effected except permitted by COR where required by limited working space. The use of repetitive devices (hammer drills, jack hammers, etc.) is prohibited when clinical user reports are received to cease work. Work shall stop until clinical user permits resumption through Project Engineer.
1. Do not store materials and equipment in other than assigned areas.
  2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access to Medical Center areas required to remain in operation.

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3. Where access by Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.
4. Use of impact/vibration producing equipment (hammer drills, jack hammers, etc.) is prohibited unless approved by Project Engineer.
- G. Phasing: The Medical Center must maintain its operation 24 hours a day 7 days a week. Therefore, any interruption in service must be scheduled and coordinated with the COR to ensure that no lapses in operation occur. It is the CONTRACTOR'S responsibility to develop a work plan and schedule detailing, at a minimum, the procedures to be employed, the equipment and materials to be used, the interim life safety measure to be used during the work, and a schedule defining the duration of the work with milestone subtasks. The work to be outlined shall include but not be limited to:
  1. To insure such executions, Contractor shall furnish the Project Engineer with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the Project Engineer two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to insure accomplishment of this work in successive phases mutually agreeable to Project and Engineer and Contractor, as follows:

Phase I: Building 200:

1. Building No. 200 will be occupied during performance of work. Pool Room and immediate areas of alterations will be vacated. Certain areas of Building No. 200 will be occupied by Medical Center personnel for various periods as listed below:
  - a. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction

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areas which serve as routes of access to such affected areas and equipment. These routes whether access or egress shall be isolated from the construction area by temporary partitions and have walking surfaces, lighting etc. to facilitate patient and staff access. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.

2. Immediate areas of alterations not mentioned in preceding Subparagraph 1 will be temporarily vacated while alterations are performed.

H. When a building and/or construction site is turned over to Contractor, Contractor shall accept entire responsibility including upkeep and maintenance therefore:

Contractor shall maintain a minimum temperature (40 degree F) at all times, except otherwise approved. Contractor shall maintain in operating condition existing fire protection and alarm equipment. In connection with fire alarm equipment, Contractor shall make arrangements for pre-inspection of site with Fire Department or Company (Department of Veterans Affairs or municipal) whichever will be required to respond to an alarm from Contractor's employee or watchman.

I. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR.

1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of COR.

Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without a detailed work plan, the Medical Center Director's

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prior knowledge and written approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, for additional requirements.

2. Contractor shall submit a request to interrupt any such services to COR, in writing, 7 days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by COR.
5. In case of a contract construction emergency, service will be interrupted on approval of COR. Such approval will be confirmed in writing as soon as practical.
6. Whenever it is required that a connection fee be paid to public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fees shall be the responsibility of the Government not the Contractor.

J. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged at the main, branch or panel they originate from. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.

K. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:

1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.

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2. Coordinate the work for this contract with other construction operations as directed by COR. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.

**1.7 ALTERATIONS**

- A. Survey: Before any work is started, the Contractor shall make a thorough survey with the COR and a representative of VA Supply Service, of buildings 200 in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by Contracting Officer. This report shall list by rooms and spaces:
  - a. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, etc., required by drawings to be removed.
  - b. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.
  - c. Shall note any discrepancies between drawings and existing conditions at site.
  - d. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and COR.
- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of COR , to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
- C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and COR together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:

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- a. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.
- D. Protection: Provide the following protective measures:
  - a. Temporary protection against existing electrical transformer.
  - b. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.
- E. Temporary Construction Partitions:
  - a. Install and maintain temporary construction partitions to provide separations between existing Electrical area and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on one side of fire retardant treated wood studs. Extend the partitions through to floor slab deck.
  - b. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration fire stop materials in accordance with Section 07 84 00, FIRESTOPPING.

**1.8 DISPOSAL AND RETENTION**

- A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:
  - 1. Reserved items which are to remain property of the Government are identified by attached tags as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by COR.
  - 2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.



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3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.

**1.9 RESTORATION**

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the COR . Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the COR before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.
- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are not scheduled for discontinuance or abandonment.
- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

**1.10 AS-BUILT DRAWINGS**

- A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.

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- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the COR review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings to the COR within 15 calendar days after each completed phase and after the acceptance of the project by the COR.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

**1.11 USE OF ROADWAYS**

- A. For hauling, use only established public roads and roads on property and, when authorized by the COR, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed and restoration performed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

**1.12 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT**

- A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will be permitted subject to written approval and compliance with the following provisions:
  - 1. Permission to use each unit or system must be given by COR in writing. If the equipment is not installed and maintained in accordance with the written agreement and following provisions, the COR will withdraw permission for use of the equipment.
  - 2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Installation of temporary electrical equipment or devices shall be in accordance with NFPA 70, National Electrical Code, (2014 Edition), Article 590, *Temporary Installations*. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.

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3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
  4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
  5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.
  6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government.
- B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.
- C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.
- D. Any damage to the equipment or excessive wear due to prolonged use will be repaired replaced by the contractor at the contractor's expense.

**1.13 TEMPORARY USE OF EXISTING ELEVATORS**

- A. Contractor will not be allowed the use of existing elevators. Outside type hoist shall be used by Contractor for transporting materials and equipment. Use of existing elevator for handling building materials and Contractor's personnel will be permitted subject to following provisions:
- a. Contractor makes all arrangements with the COR for use of elevators. The COR will ascertain that elevators are in proper condition. Contractor may use Service Elevators in Building Nos. 200 for exclusive use, for daily use only after 5:00 pm and for special nonrecurring time intervals when permission is granted. Personnel for operating elevators will not be provided by the Department of Veterans Affairs.
  - b. Contractors covers and provides maximum protection of following elevator components:
    - i. Entrance jambs, heads soffits and threshold plates.

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- ii. Entrance columns, canopy, return panels and inside surfaces of car enclosure walls.

c. Finish Flooring

- B. Government will accept hoisting ropes of elevator and rope of each speed governor if they are worn under normal operation. However, if these ropes are damaged by action of foreign matter such as sand, lime, grit, stones, etc., during temporary use, they shall be removed and replaced by new hoisting ropes at the contractor's expense.
- C. All parts of main controller started, relay panel, selector, etc., worn or damaged during temporary use shall be removed and replaced with new parts at the contractor's expense, if recommended by elevator inspector after elevator is released by Contractor.
- D. Place elevator in condition equal, less normal wear, to that existing at time it was placed in service of Contractor as approved by the Contracting Officer.

**1.14 TEMPORARY TOILETS**

- A. Provide where directed, (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by COR, provide suitable dry closets where directed. Keep such places clean and free from flies and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

**1.15 AVAILABILITY AND USE OF UTILITY SERVICES**

- A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities furnished without charge.
- B. The Contractor, at Contractor's expense and in a workmanlike manner, in compliance with code and as satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections,

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distribution lines, meters, and associated paraphernalia and repair restore the infrastructure as required.

- C. Contractor shall install meters as Contractor's expense and furnish the Medical Center a monthly record of the Contractor's usage of electricity as hereinafter specified.
- D. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:
  - a. Obtain heat by connecting to Medical Center heating distribution system.
- E. Electricity (for Construction and Testing): Furnish all temporary electric services.
  - a. Obtain electricity by connecting to the Medical Center electrical distribution system. The Contractor shall meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Electricity for all other uses is available at no cost to the Contractor.
- F. Water (for Construction and Testing): Furnish temporary water service.
  - a. Obtain water by connecting to the Medical Center water distribution system. Provide reduced pressure backflow preventer at each connection as per code. Water is available at no cost to the Contractor.
  - b. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation (at COR discretion) of use of water from Medical Center's system.
- G. Fuel: Natural and LP gas and burner fuel oil required for boiler cleaning, normal initial boiler-burner setup and adjusting, and for performing the specified boiler tests will be furnished by the Government. Fuel required for prolonged boiler-burner setup, adjustments, or modifications due to improper design or operation of boiler, burner, or control devices shall be furnished and paid by the Contractor at Contractor's expense.

**1.16 NEW TELEPHONE EQUIPMENT**

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- A. The contractor shall coordinate with the work of installation of telephone equipment by others. This work shall be completed before the building is turned over to VA.

**1.17 TESTS**

- A. As per specification section 23 05 93 the contractor shall provide a written testing and commissioning plan complete with component level, equipment level, sub-system level and system level breakdowns. The plan will provide a schedule and a written sequence of what will be tested, how and what the expected outcome will be. This document will be submitted for approval prior to commencing work. The contractor shall document the results of the approved plan and submit for approval with the as built documentation.
- B. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.
- C. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.
- D. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire system which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, controls and electricity, etc. Another example of a system which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of fuel, combustion air, controls, steam, feed water, condensate and other related components.
- E. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonable period of time during which operating and environmental conditions remain reasonably constant and are typical of the design conditions.

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- F. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

**1.18 INSTRUCTIONS**

- A. Contractor shall furnish Maintenance and Operating manuals (hard copies and electronic) and verbal instructions when required by the various sections of the specifications and as hereinafter specified.
- B. Manuals: Maintenance and operating manuals and one compact disc (four hard copies and one electronic copy each) for each separate piece of equipment shall be delivered to the COR coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.
- C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed training to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the

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system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the COR and shall be considered concluded only when the COR is satisfied in regard to complete and thorough coverage. The contractor shall submit a course outline with associated material to the COR for review and approval prior to scheduling training to ensure the subject matter covers the expectations of the VA and the contractual requirements. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

**1.19 GOVERNMENT-FURNISHED PROPERTY- (NOT USED)**

**1.20 RELOCATED // EQUIPMENT // ITEMS //**

- A. Contractor shall disconnect, dismantle as necessary, remove and reinstall in new location, all existing equipment and item indicated by symbol "R" or otherwise shown to be relocated by the Contractor.
- B. Perform relocation of such equipment or items at such times and in such a manner as directed by the COR.
- C. Suitably cap existing service lines, such as steam, condensate return, water, drain, gas, air, vacuum and/or electrical, at the main whenever such lines are disconnected from equipment to be relocated. Remove abandoned lines in finished areas and cap as specified herein before under paragraph "Abandoned Lines".
- D. Provide all mechanical and electrical service connections, fittings, fastenings and any other materials necessary for assembly and installation of relocated equipment; and leave such equipment in proper operating condition.
- E. All service lines such as noted above for relocated equipment shall be in place at point of relocation ready for use before any existing equipment is disconnected. Make relocated existing equipment ready for operation or use immediately after reinstallation.

**1.21 STORAGE SPACE FOR DEPARTMENT OF VETERANS AFFAIRS EQUIPMENT**

- A. If contractor requires on site storage space it must be indicated in the proposal package with a detailed description of the material being stored,



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the duration required, and any special requirements. On site storage is subject to the approval of the COR.

**1.22 SAFETY SIGN**

- A. Provide a Safety Sign where directed by COR. Face of sign shall be 3/4 inch thick exterior grade plywood. Provide two 100 mm by 100 mm (four by four inch) posts extending full height of sign and 900 mm (three feet) into ground. Set bottom of sign level at 1200 mm (four feet) above ground.
- B. Paint all surfaces of Safety Sign and posts with one prime coat and two coats of white gloss paint. Letters and design shall be painted with gloss paint of colors noted.
- C. Maintain sign and remove it when directed by COR.
- D. Standard Detail Drawing Number SD10000-02(Found on VA TIL) of safety sign showing required legend and other characteristics of sign is attached hereto and is made a part of this specification.
- E. Post the number of accident free days on a daily basis.

Estimated Cost		No. of Photographs
Up to	\$250,000	50 to 100
" "	\$500,000	100 to 150
" "	\$1,000,000	150 to 200
" "	\$2,000,000	200 to 250
" "	\$5,000,000	250 to 300
" "	\$10,000,000	300 to 400
More than	\$10,000,000	400 to 500

**1.23 PHOTOGRAPHIC DOCUMENTATION**

- A. Contractor will be required to provide picture documentation of progress at a minimum of 25%, 50%, 75%, and 100% completion. At each progress update a minimum of 10 site pictures will be required. Pictures shall be in electronic format and provided via CD or FTP website. Contractor is not allowed to photograph any patient or staff. .

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B. Photographic documentation elements:

1. Regular (8 max) interior progressions of all walls of the entire project to begin at time of substantial framed or as directed by the COR through to completion.
2. Detailed Exact-Built of all Slabs for all project slabs pours just prior to placing concrete or as directed by the COR.
3. Detailed Interior exact built overlapping photos of the entire building to include documentation of all mechanical, electrical and plumbing systems in every wall and ceiling, to be conducted after rough-ins are complete, just prior to insulation and or drywall, or as directed by Resident COR.
4. Finished detailed Interior exact built overlapping photos of all walls, ceilings, and floors to be scheduled by COR prior to occupancy.

- C. Contractor shall provide all on-line domain/web hosting, security measures, and redundant server back-up of the documentation.
- D. Contractor shall provide technical support related to using the system or service.
- E. Upon completion of the project, final copies of the documentation (the "Permanent Record") with the indexing and navigation system embedded (and active) shall be provided in an electronic media format, typically a DVD or external hard-drive. Permanent Record shall have Building Information Modeling (BIM) interface capabilities. On-line access terminates upon delivery of the Permanent Record.

**1.24 GENERAL RESTRICTIONS/PERMIT PACKAGE:**

**A. The VA will provide the contractors the Bid package. Inside the package will be ICRA, PCRA, ILSM forms, Dig Permit, Above Ceiling Permit, GEMS policy, and Hot Work Permit.**

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**SECTION 01 01 10 - 1HR**  
**1 HOUR CONSTRUCTION SMOKE BARRIER**

**1. DESCRIPTION**

This section specifies the control of the construction barrier surrounding the construction area the Contractor must consider for construction & renovation projects in the medical facility. It includes Precautionary management of, Inspections and Non-invasive activities, small scale, short duration activities, which create minimal fire hazard risk. Major demolition and construction projects that are high risk. The Contractor is obligated to consider the specified containment measures with the costs included within the various contract items of work. A **Construction Barrier and Fire Risk Assessment Matrix of Precautions** for construction and renovation for activities follows.

<b>TYPE A</b>  Minimal Fire Risk	<ul style="list-style-type: none"><li>▪ Not used</li></ul>
<b>TYPE B</b>  Limited Fire Risk	<ul style="list-style-type: none"><li>▪ Not used</li></ul>
<b>TYPE C</b>  Moderate Fire Risk	<p>Work that requires a moderate to high level of demolition, cutting/burning operations or requires demolition or removal of any fixed building components or assemblies. Power corded tools and work that provides a potential fire hazard.</p> <p>Includes, but is not limited to:</p> <ul style="list-style-type: none"><li>▪ Removal of building components or elements requiring use of open flame or power chisel</li><li>▪ new construction or renovations over 3 days duration</li><li>▪ major duct work, plumbing, piping, or electrical work</li><li>▪ soldering or brazing operations</li><li>▪ ANY activity that requires a burn permit</li></ul>
<b>TYPE D</b>  Significant Fire Risk	<ul style="list-style-type: none"><li>▪ Not used</li></ul>

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**2. TEMPORARY CONSTRUCTION PARTITIONS (NOTE: COORDINATE INFECTION CONTROL BARRIERS WITH CONSTRUCTION PARTITIONS):**

- A. Type A: Not used
- B. Type B: not used
- C. Type C: Install and maintain Infection Control temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Coordinate with Section 01 01 10-IC. Provide heat detectors and notification devices (i.e., audio-visual devices) tied into the Building Siemens Pyrotronics System, in ante room and 1 per 900-1000 square foot of clear construction area. Heat detectors to be FTP-11 Addressable, Tri-Color LED, 135°F, Combination Fixed or Rate of Rise. Contractor to provide certification documentation once the heat detectors and notification devices (i.e., audio-visual devices) are installed and/or moved and tested prior to any construction work taking place in the space. Outside the ante room, existing units can be used if they are moved to the floor deck above. Separate all occupied areas from demolition, renovation, or construction activities by temporary smoke-tight construction partitions of gypsum board. For partitions in duration of 3 days to 14 days, the seams of the gypsum board construction shall be taped with E-Z Fire Tape; both sides and ceilings and from walls to floor. For partitions in duration over 14 days, the seams of the gypsum board construction shall be mudded and taped with ASTM C840 approved compound or E-Z Fire Tape; both sides and ceilings and duct tape from walls to floor. Other than ante room, new partitions shall be full height, extending through suspended ceilings to the floor slab or roof deck above and shall be one-hour fire rated 5/8" type X gypsum board both sides of metal stud wall, mudded and taped in accordance with ASTM C840. If sprinklers are installed per a

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hydraulically calculated stamped and certified system and sprinklers are operational on both sides of the temporary partition and ceilings are fully intact and complete, then the partition (2 layers 5/8" type X) indicated above may be permitted to terminate at the ceiling in accordance with NFPA 241. Provide plastic Z Type door at the interior construction ante room doorway. At outer ante room construction door openings, install Class C, ¾ hour fire/smoke rated doors with self-closing devices.

**3. WALLS TO BE USED FOR CONSTRUCTION PARTITION AND PHASING.**

- A. The construction site must be completely surrounded by the construction partitions described above. Infection control procedures need to be initiated prior to any other construction activities. Where construction walls are to function as infection control barriers, add infection control measures (e.g., plastic sheeting between metal studs and gypsum board).
- B. Existing walls - All existing walls surrounding the construction are to be inspected, repaired, patched, and fire stopped as required to bring them up to current smoke barrier construction requirements, as follows:
  - i. for annular space gaps, holes, and cracks less than 1/4" width: intumescent red fire caulk
    - a) Number of individual conduits, pipes and cables <1" = 10
    - b) Number of individual conduits, pipes and cables  
1" to 3" dia. = 4
    - c) Number of individual conduits, pipes and cables  
4" to 6" dia. = 4
  - ii. for larger annular spaces and holes: pack with mineral wool and either patch with drywall and trim with fire caulk or apply a coating of 3M FireDam 200 Spray, or other approved

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firestopping methods based on the manufacture of the firestopping material or VA-approved equal coating.

- a) Around conduits / pipes up to 2"Ø = 7
  - b) Holes, larger, total square feet, not requiring new studs, patch up to 10 sf.
  - c) HVAC ducts - pull back insulation, trim with metal angles and fire caulk, lineal feet perimeter around ductwork = 20 lf.
- iii. For walls where the gypsum board stops below the existing floor deck above; extend gypsum board construction to deck above to meet 1 hour requirements.
- a) Square feet of wall to extend to deck = 24 sf.
- iv. These walls can then be used as part of the construction partition. All work associated with this construction shall be accomplished immediately after the infection control work has been provided.
- v. Construction cores made through the construction barriers and any rated assembly need to have an ILSM firestop such as mineral wool filling including a "ILSM FIRESTOP" label as indicated below, in place for all penetrations made smoke resistant at the end of the construction day and penetrations are to be fire caulked/sealed within 30 days of being made. All penetrations will be labeled with the VA orange tag once made.

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**ILSM FIRESTOP**

**PROJECT:** \_\_\_\_\_

**PRIME CONTR:** \_\_\_\_\_

**CORE CONTR:** \_\_\_\_\_

**PENETRATION DATE:** \_\_\_\_\_

**EXPIRATION DATE:** \_\_\_\_\_  
(MAX 30 DAYS)

- C. The Ante Room when required by infection control for the construction site will consist of a contractor provided yellow 90-minute self closing and latching construction door and frame. Metal studs and 5/8" drywall 1-hour fire rated wall and ceiling enclosure abutting the smoke barrier construction wall.
- D. VA ILSM Temporary Barrier Tag

**ILSM TEMPORARY BARRIER TAG**

**PROJECT:** \_\_\_\_\_

**PRIME CONTRACTOR:** \_\_\_\_\_

**SUB CONTRACTOR:** \_\_\_\_\_

**EMERGENCY CONTACT NO.** \_\_\_\_\_

**BARRIER INSTALLATION DATE:** \_\_\_\_\_

**BARRIER EXPIRATION DATE:** \_\_\_\_\_  
(MAX 3 DAYS)

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**SECTION 01 01 10 - FSS**  
**FIRE SAFETY SECTION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section covers safety precautions required by all contractor personnel to safeguard patients, visitors, and Department of Veterans Affairs employees.

**1.2 RELATED SECTION**

- A. Section 01 00 00 - GENERAL REQUIREMENTS

**1.3 APPLICABLE PUBLICATIONS**

- A. NFPA standard No. 241 - Safeguarding Construction, Alteration, and Demolition Operations.
- B. NFPA Standard No. 51B - Fire Protection in use of cutting and welding Processes.
- C. NFPA Standard No. 101 - Life Safety Code (Current Edition)
- D. NFPA Standard No. 13 - Standard for the Installation of Sprinkler Systems.
- E. NFPA Standard No. 72 - National Fire Alarm Code.
- F. NFPA Standard No. 10 - Standard for Portable Fire Extinguisher's.
- G. OSHA Regulations 29CFR1926 - Construction Industry Standards.
  - 1. Sub-part P- Fire Protection and Prevention
  - 2. Sub-part J- welding and Cutting

**PART 2 - PRODUCTS**

**2.1 PRODUCTS:**









- A. All fire protection materials shall be UL. listed and F.M. approved and shall be installed per their manufacturer's specifications
- B. Table F-1 indicates which fire extinguishers are required for various combustible materials.



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**Table F-1 FIRE EXTINGUISHERS DATA**

TYPE OF AGENT					
Each class of fire calls for the right kind of extinguisher. Using the wrong extinguisher is dangerous and may do more harm than good. For your own protection, you should know the classes of fire, the different types of extinguishers, how to use them and why.	Multi-Purpose Dry Chemical Monoammonium Phosphate	Regular Dry Chemical Sodium Phosphate	Halon 1211 Bromochlorodifluoromethane	Carbon Dioxide (CO <sub>2</sub> )	Water
 Fires in ordinary combustible materials - paper, wood, and many plastics. Quenching by water or insulating by Multi-Purpose (ABC), dry chemical is effective.	Yes-excellent Adheres to burning materials and forms a coating which will smother the fire and minimize reflash.	No	Yes-excellent Halon 1211 leaves no residue. May not normally affect equipment.	No	Yes Water saturates materials and prevents rekindling.
 Fires in flammable liquids such as gasoline, oils, grease, tars, paints, lacquers and flammable gases. Multi-Purpose (ABC), Regular Dry Chemical, Halon 1211, and Carbon Dioxide agents smother these fires.	Yes-excellent Dry chemical agent smothers fire. Screen of agent shields user from heat.	Yes-excellent Dry chemical agent smothers fire. Screen of agent shields user from heat.	Yes-excellent Halon 1211 leaves no residue. May not normally affect equipment.	Yes-excellent Carbon Dioxide leaves no residue, may not normally affect or damage equipment.	No Water will spread flammable liquids and not put it out.
 Fires in electrical equipment.. Motors, generators, switches and appliances.. where a non conducting extinguishing agent Multi-Purpose (ABC), Regular Dry Chemical, Halon 1211 or Carbon Dioxide is required.	Yes-excellent Dry chemical agent is non-conductive. Screen of agent shields user from heat.	Yes-excellent Dry chemical agent is non-conductive. Screen of agent shields user from heat.	Yes-excellent Halon 1211 is a non-conductor, leaves no residue, may not normally affect or damage electrical equipment.	Yes-excellent Carbon Dioxide is a non-conductor, leaves no residue, may not normally affect or damage electrical equipment.	No Water, a conductor, should never be used on live electrical fires.
RANGE ----- Discharge Time -----	5 to 20 feet 10 to 25 seconds	5 to 20 feet 10 to 25 seconds	8 to 18 feet 8 to 18 seconds Depending on size	3 to 8 feet 8 to 30 seconds	Up to 40 feet Up to 60 seconds

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**PART 3 - EXECUTION**

- A. Construction offices and trailers used as storage are required to a located minimum distance from permanent structures. Veterans Administration approval of location does not relieve the contractor at this ultimate responsibility of meeting OSHA and NFPA Regulation.
- B. Contractor is required to obtain a permit from the office of the Chief Engineer prior to start of each welding/cutting operation. The Chief Engineer reserves the right to delegate the Project Manager as approving official. The following form is acceptable for obtaining approval and may be reproduced at contractor's expense. Other form must be submitted for approval by the Project Engineer prior to use.
- C. The following checklist is provided to the contractor as a quick reference only. NFPA 513 should be consulted for official requirements for protection of the area.

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**REQUEST FOR SPRINKLER SYSTEM SHUTDOWN**

Date Closed:	_____	Time Closed:	_____
Planned Date Restored:	_____	Time Restored:	_____
Location of System:	Bldg: _____	Floor: _____	Wing: _____
Area this will affect:	_____		
Impact on adjacencies:	_____		
Reason for shutdown:	_____		
If Construction, Give Project#:	_____	Generic Maintenance Contract	_____
Sprinkler Contractor:	_____	General Contractor:	_____
Phone:	_____	Phone:	_____
Remarks:	_____	Approval [ x ]	Disapproval [ ]
Approving Authority Comments: _____			

\_\_\_\_\_  
Signature/Approval Authority

**Copy one (1) VAMC, Form No 138-S1**

**Revised 2/05**

Location of System: Building: _____	Date Valve Reopened: _____
Wing: _____	Time Valve Reopened: _____
Floor: _____	Date Closed: _____
	Time Closed: _____
Print Name _____	Signature of Requestor _____
	Signature of FM Divisional Manager _____
REQUESTOR OF SHUTDOWN ID: O-001391	
Copy two (2) VAMC, Form No 138-S2	Copy three (3) VAMC, Form No 138-S3 1,421

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**PERMIT FOR CUTTING AND WELDING WITH PORTABLE GAS,  
ELECTRICAL, OR ARC EQUIPMENT**

Date Disabled: \_\_\_\_\_ Time Disabled: \_\_\_\_\_  
Planned Date Restored: \_\_\_\_\_ Time Restored: \_\_\_\_\_  
Location of System: Bldg: \_\_\_\_\_ Floor: \_\_\_\_\_ Wing: \_\_\_\_\_  
Area this Will Affect: \_\_\_\_\_ Impact on Adjacencies: \_\_\_\_\_  
*The location where the work is to be done had been examined, necessary precautions taken, and permission is granted for this work.*  
Work to Be Accomplished: \_\_\_\_\_  
Construction Project#: \_\_\_\_\_ Generic Maintenance Contract \_\_\_\_\_  
Subcontractor: \_\_\_\_\_ General Contractor: \_\_\_\_\_  
Phone: \_\_\_\_\_ Phone: \_\_\_\_\_  
Approval [ ] Disapproval [ ]  
Signature/Approval Authority \_\_\_\_\_ Approving Authority Comments: \_\_\_\_\_

ATTENTION

Before approving any cutting and welding permit, the Contractor's fire safety supervisor or his appointee and/or the PAI or his designee shall inspect the work area and confirm that precautions have been taken to prevent fire in accordance with NFPA 51B. Contractor is responsible to check off each item below that applies or indicate N/A.

PRECAUTIONS

- \_\_\_\_\_ Sprinklers in service. Fully charged and operable fire extinguishers that are appropriate for the type of possible fire shall be available immediately at the work area.  
\_\_\_\_\_ The hot work equipment to be used shall be in satisfactory operating condition and in good repair.  
\_\_\_\_\_ The following shall apply to hot work done in close proximity to a sprinkler head:  
(a) A wet rag shall be laid over the sprinkler head and then removed at the conclusion of the welding or cutting operation.  
(b) During hot work, special precautions shall be taken to avoid accidental operation of automatic fire detection or suppression systems (e.g., special extinguishing systems or sprinklers).  
\_\_\_\_\_ Nearby personnel shall be suitably protected against dangers such as heat, sparks, and slag.

WITHIN 35 FT. OF WORK

- \_\_\_\_\_ Floors swept clean of combustibles  
\_\_\_\_\_ If relocation is impractical, combustibles shall be protected with fire-retardant covers or otherwise shielded with metal or fire-retardant guards or curtains.  
\_\_\_\_\_ Combustible floors (except wood on concrete) shall be kept wet, covered with damp sand, or protected by noncombustible or fire-retardant shields.  
\_\_\_\_\_ Where floors have been wet down, personnel operating arc welding equipment or cutting equipment shall be protected from possible shock.  
\_\_\_\_\_ Openings or cracks in walls, floors, or ducts within 11 m (35 ft) of the site shall be tightly covered with fire-retardant or noncombustible material to prevent the passage of sparks to adjacent areas.  
\_\_\_\_\_ Covers suspended beneath work to collect sparks

WORK ON WALLS OR CEILINGS

- \_\_\_\_\_ Construction noncombustible and without combustible covering  
\_\_\_\_\_ Combustibles moved away from opposite side of wall  
\_\_\_\_\_ If hot work is done near walls, partitions, ceilings, or roofs of combustible construction, fire-retardant shields or guards shall be provided to prevent ignition.  
\_\_\_\_\_ If hot work is done on one side of a wall, partition, ceiling, or roof, one of the following criteria shall be met:  
(a) Precautions shall be taken to prevent ignition of combustibles on the other side by relocating the combustibles.  
(b) If it is impractical to relocate combustibles, a fire watch shall be provided on the side opposite from where the work is being performed.

WORK ON ENCLOSED EQUIPMENT

(Tanks, containers, ducts, dust collectors, etc.)

- \_\_\_\_\_ Containers purged of flammable vapors  
\_\_\_\_\_ Ducts and conveyor systems that might carry sparks to distant combustibles shall be shielded, or shut down, or both.

FIRE WATCH

- \_\_\_\_\_ To be provided during and 30 minutes after operation  
\_\_\_\_\_ Supplied with extinguisher  
\_\_\_\_\_ Trained in use of equipment and in sounding fire alarm

FINAL CHECK-UP

- \_\_\_\_\_ Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite sides of walls) were inspected 30 minutes after the work was completed and were found fire safe.

Signed: \_\_\_\_\_  
(Supervisor of Fire Watcher)

Contract No. VA69D-13-C-0324  
Station Project No. 578-15-033  
Bancroft-AE Project No. 13-126

01 01 10-FSS-5

06/17/2016

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**SECTION 01 01 10 - IC**  
**INFECTION CONTROL**

**PART 1 - DESCRIPTION**

1. This section specifies the control of environmental infection control and risk assessment that the Contractor must consider for construction & renovation projects in the medical facility. It includes Precautionary management of, Inspections and Non invasive activities, small scale, short duration activities, that create minimal dust. Major demolition and construction projects that generate a moderate to high levels of dust. Movement of materials and equipment, and resources that are encountered or generated by the Contractor. The Contractor is obligated to consider the specified control measures with the costs included within the various contract items of work. An ***Infection Control Risk***

Step 1. **Identify Construction Activity - see specification**  
**section 01 01 10 1-HR**

***Assessment Matrix of Precautions*** for construction and renovation for activities follows.

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Step 2. **Identify Patient Risk Group**

<b>TYPE A</b>  Minimal Fire Risk	<b>Inspection and Non-Invasive Activities.</b> <ul style="list-style-type: none"><li>▪</li></ul>
<b>TYPE B</b>  Limited Fire Risk	<b>Small scale, short duration activities which create minimal dust</b> Includes, but is not limited to: <ul style="list-style-type: none"><li>▪ installation of telephone and computer cabling</li><li>▪ access to chase spaces</li><li>▪ cutting of walls or ceiling where dust migration can be controlled.</li></ul>
<b>TYPE C</b>  Moderate Fire Risk	<ul style="list-style-type: none"><li>▪</li></ul>
<b>TYPE D</b>  Significant Fire Risk	<ul style="list-style-type: none"><li>▪</li></ul>

B. Infection Control Risk and damage is defined as the presence of chemical, physical, or biological elements or agents which:

1. Adversely effect human health or welfare,
2. Unfavorably alter ecological balances of importance to human life.

Using the following table, ***identify the Patient Risk Groups*** that will be affected.

If more than one risk group will be affected, select the higher risk group:

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Low Risk	Medium Risk	High Risk	Highest Risk
<ul style="list-style-type: none"> <li>Office areas</li> </ul>	<ul style="list-style-type: none"> <li>Cardiology</li> <li>Echocardiography</li> <li>Endoscopy</li> <li>Nuclear Medicine</li> <li>Physical Therapy</li> <li>Radiology/MRI</li> <li>Respiratory Therapy</li> </ul>	<ul style="list-style-type: none"> <li>CCU</li> <li>Emergency Room</li> <li>Labor &amp; Delivery</li> <li>Laboratories (specimen)</li> <li>Newborn Nursery</li> <li>Outpatient Surgery</li> <li>Pediatrics</li> <li>Pharmacy</li> <li>Post Anesthesia Care Unit</li> <li>Surgical Units</li> <li>Linen</li> <li>Kitchen &amp; Canteen</li> </ul>	<ul style="list-style-type: none"> <li>Any area caring for immunocompromised patients</li> <li>Burn Unit</li> <li>Cardiac Cath Lab</li> <li>Central Sterile Supply</li> <li>Intensive Care Units</li> <li>Medical Unit</li> <li>Negative pressure isolation rooms</li> <li>Oncology</li> <li>Operating rooms including C-section rooms</li> <li>Dialysis</li> </ul>

C. Match the *Patient Risk Group with Construction Project Type* on the following matrix to find the level of **infection control activities required**.

**Patient Risk Group** (*Low, Medium, High, Highest*) with the planned ...

**Construction Project Type** (*A, B, C, D*) on the following matrix, to find the ...

**Class of Precautions** (*I, II, III or IV*) or level of infection control activities required.

- 1) Infection Control approval will be required when the Construction Activity and Risk Level indicate that **Class III** or **Class IV** control procedures are necessary. Contact the VA Project engineer and the infection control officer before

### Step 3. Identify Level of Infection Control Activities Required

proceeding.

### IC Matrix - Class of Precautions: Construction Project by Patient Risk

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### Construction Project Type

Patient Risk Group	TYPE A	TYPE B	TYPE C	TYPE D
<b>LOW Risk Group</b>	<b>I</b>	<b>II</b>	<b>II</b>	<b>III/IV</b>
<b>MEDIUM Risk Group</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>
<b>HIGH Risk Group</b>	<b>I</b>	<b>II</b>	<b>III/IV</b>	<b>IV</b>
<b>HIGHEST Risk Group</b>	<b>II</b>	<b>III/IV</b>	<b>III/IV</b>	<b>IV</b>

#### D. Description of Required Infection Control Precautions by Class

During Construction Project		Upon Completion of Project
<b>CLASS I</b>	<ol style="list-style-type: none"> <li>Execute work by methods to minimize raising dust from construction operations.</li> <li>Immediately replace a ceiling tile displaced for visual inspection</li> </ol>	
<b>CLASS II</b>	<ol style="list-style-type: none"> <li>Provide active means to prevent airborne dust from dispersing into atmosphere.</li> <li>Water mist work surfaces to control dust while cutting.</li> <li>Seal unused doors with duct tape.</li> <li>Block off and seal air vents.</li> <li>Place dust mat at entrance and exit of work area</li> <li>*Remove or isolate HVAC system in areas where work is being performed.</li> </ol>	<ol style="list-style-type: none"> <li>Wipe work surfaces with disinfectant.</li> <li>Contain construction waste before transport in tightly covered containers.</li> <li>Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.</li> <li>Remove isolation of HVAC system in areas where work is being performed.</li> </ol>
<b>CLASS III</b>	<ol style="list-style-type: none"> <li>*Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system.</li> <li>Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins.</li> <li>Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.</li> <li>Contain construction waste before transport in tightly covered containers.</li> <li>Cover transport receptacles or carts. Tape covering unless solid lid.</li> <li>* Use window for negative HEPA air exhaust when accessible. Obtain V.A, resident engineer approval for exhausting in existing exhaust ductwork.</li> </ol>	<ol style="list-style-type: none"> <li>Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department.</li> <li>Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.</li> <li>Vacuum work area with HEPA filtered vacuums.</li> <li>Wet mop area with disinfectant.</li> <li>Remove isolation of HVAC system in areas where work is being performed.</li> </ol>



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<b>CLASS IV</b>	<ol style="list-style-type: none"> <li>1. Isolate HVAC system in area where work is being done to prevent contamination of duct system.</li> <li>2. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins.</li> <li>3. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.</li> <li>4. Seal holes, pipes, conduits, and punctures appropriately.</li> <li>5. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave the work site.</li> <li>6. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.</li> <li>7. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove barrier material carefully to minimize spreading of dirt and debris associated with construction.</li> <li>2. Contain construction waste before transport in tightly covered containers.</li> <li>3. Cover transport receptacles or carts. Tape covering unless solid lid</li> <li>4. Vacuum work area with HEPA filtered vacuums.</li> <li>5. Wet mop area with disinfectant.</li> <li>6. Remove isolation of HVAC system in areas where work is being performed.</li> </ol>

E. Identify the area surrounding the project area, assessing potential impact.

Unit Below	Unit Above	Lateral	Lateral	Behind	Front
Risk Group	Risk Group	Risk Group	Risk Group	Risk Group	Risk Group

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- Step 4. Identify the areas surrounding the project area, assessing potential impact**
- Step 5. Identify specific site of activity eg, patient rooms, medication room, etc.**
- Step 6. Identify issues related to: ventilation, plumbing, electrical in terms of the occurrence of probable outages.**
- Step 7. Identify containment measures, using prior assessment. What types of barriers?**  
**(Eg, solids wall barriers); Will HEPA filtration be required?**
- Step 8. Consider potential risk of water damage. Is there a risk due to compromising structural integrity? (eg, wall, ceiling, roof)**
- Step 9. Work hours: Can or will the work be done during non-patient care hours?**
- Step 10. Do plans allow for adequate number of isolation/negative airflow rooms?**
- Step 11. Do the plans allow for the required number & type of handwashing sinks?**
- Step 12. Does the infection control staff agree with the minimum number of sinks for this project?** (Verify against AIA Guidelines for types and area)
- Step 13. Does the infection control staff agree with the plans relative to clean and soiled utility rooms?**
- Step 14. Plan to discuss the following containment issues with the project team. Eg, traffic flow, housekeeping, debris removal (how and when)**

**PROJECT 2****INSTALL ELECTRICAL SERVICE FOR RADIOLOGY EXPANSION****BUILDING 200**

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<b>Infection Control Construction Permit</b>				
				Permit No:
Location of Construction:			Project Start Date:	
Project Coordinator:			Estimated Duration:	
Contractor <u>Performing Work</u>			Permit Expiration Date:	
Supervisor:			Telephone:	
YES	NO	CONSTRUCTION ACTIVITY	YES NO	INFECTION CONTROL, RISK GROUP
		TYPE A: <u>Inspection, non-invasive activity</u>		GROUP 1: Low Risk
		TYPE B: Small scale, short duration, moderate to <u>high levels</u>		GROUP 2: Medium Risk
		TYPE C: Activity generates moderate to high levels of dust, re Lures eater 1 work shift for <u>completion</u>		GROUP 3: Medium/high Risk
		TYPE D: Major duration arid construction activities <u>Requiring consecutive work shifts</u>		GROUP 4: Highest Risk
CLASS I		1. Execute work by methods to minimize raising dust from construction operations. 2. Immediately replace any ceiling tile displaced for visual <u>inspection</u> . 3. Minor Demolition for Remodeling		
CLASS 11		1. Provides active means to prevent air-bone dust from dispersing into atmosphere 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tape. 4. Block off and seal air vents. 5. Wipe surfaces with disinfectant. 6. Contain construction waste before transport in tightly covered containers. 7. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 8. Place dust mat at entrance and exit of work area. 9. Remove or isolate HVAC system in areas where work is being <u>performed</u> .		
CLASS 111		1. Obtain infection control pennit before construction begins. 2. Isolate HVAC system in area where work is being done to prevent contamination of the duct system. 3. Complete all critical barriers or implement control cube method before construction begins. 4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 5. Do not remove barriers from work area until complete <u>project is thoroughly cleaned by Env. Services Dept.</u> 6. Vacuum work with HEPA filtered vacuums. 7. Wet mop with disinfectant 8. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 9. Contain construction waste before transport in tightly covered containers. 10. Cover transport receptacles or carts. Tape covering. 11. Remove or isolate HVAC system in areas where work is being performed/		
Class IV		1. Obtain infection control permit before construction begins. 2. Isolate HVAC= system in area where work is being done to prevent contamination of duct system. 3. Complete all critical barriers or implement control cube method before construction begins. 4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 5. Seal holes, pipes, conduits, and punctures appropriately. 6. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave the work site. 7. All personnel entering work site are required to wear shoe covers 8. Do not remove barriers from work area until completed project is thoroughly cleaned by the Environmental Service Dept. 9. Vacuum work area with HEPA filtered vacuums. 10. Wet mop with disinfectant. 11. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 12. Contain construction waste before transport in tightly covered containers. 13. Cover transport receptacles or carts. Tape covering. 14. Remove or isolate HVAC system in areas where is bein done.		
Additional Requirements:				
Exceptions/Additions to this permit Date				
Date Initials		Initials are noted b attached memoranda		
Permit Request By:			Permit Authorized By:	
Date:			Date:	

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- A. Apply Life Safety and standards (APIC) and the following criteria would need to be assured in order to maintain the supply air side open during Class 4 construction activity:
- B. There is no re circulated air in this section
- C. There is no duct work involved in this section of the demolition
- D. The site can never be positive to the adjacent areas (i.e. keep the negative air machines on at all times or for 1-2 hours post site work until the negative action can be maintained.
- E. A log is maintained to document that the negative pressure is checked and has been maintained during those hours when the negative air machines are turned off. (An alarmed device is recommended for this purpose and should be maintained and monitored by the construction personnel).

**PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT**

**2.1 MATERIALS AND EQUIPMENT**

GENERAL REQUIREMENTS

- A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable). When transporting new materials & equipment though the hospital use 4 mil Poly sheeting encasing materials, tools and equipment or use a totally enclosed cart.
- B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated/work area until construction is completed.
- C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized place.
- D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.

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E. Demolition materials must be transported in totally enclosed containers.

**2.2 NEGATIVE PRESSURE FILTRATION SYSTEM-**

The Contractor shall provide enough negative air machines to completely exchange the regulated area air volume 4 actual times per hour. The Competent Person shall determine the number of units needed for each regulated area by dividing the cubic feet in the regulated area by 15 and then dividing that result by the actual cubic feet per minute (cfm) for each unit to determine the number of units needed to effect 4 air changes per hour. Provide a standby unit in the event of machine failure and/or emergency in an adjacent area.

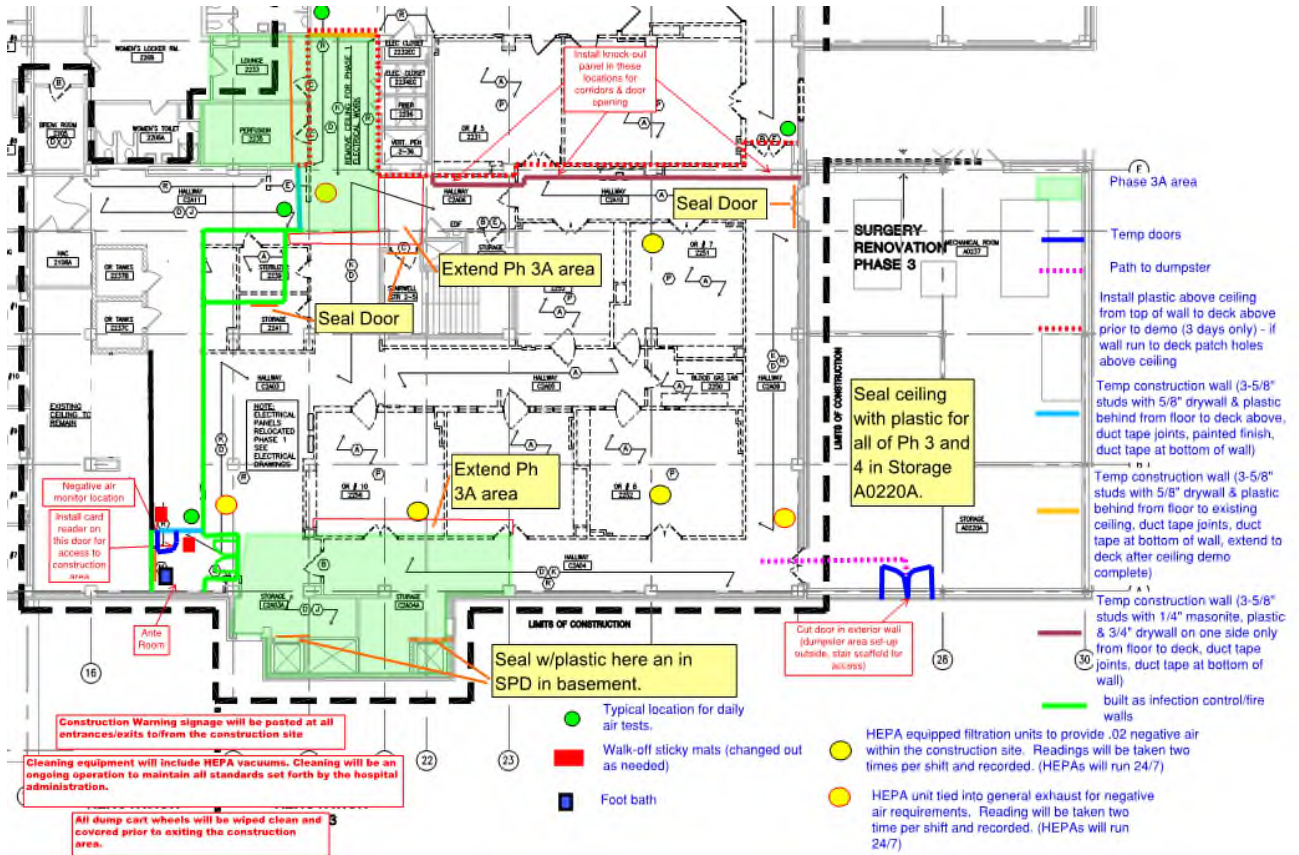
**2.1.3 DESIGN AND LAYOUT**

Before start of work for each phase of the project, the contractor is to submit for approval, an infection control plan which will include the design and layout of the regulated area to include the type and location of infection control construction barriers to be used, access points, ante room location, etc. The submittal shall indicate the number of, location of and size of negative air machines and exhaust route & location of the windows to be used. The point(s) of exhaust, air flow within the regulated area, anticipated negative pressure differential, and supporting calculations for sizing shall be provided. In addition, submit the following:

1. Manufacturer's information on the negative air machine(s).
2. Method of supplying power to the units and designation/location of the panels.
3. Description of testing method(s) for correct air volume and pressure differential. Provide manufacturer's product data on the pressure differential measuring device used.
4. If auxiliary power supply is to be provided for the negative air machines, provide a schematic diagram of the power supply and manufacturer's data on the generator and switch.
5. Location of isolation negative air pressure monitor.

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6. The following is a SAMPLE plan:



SAMPLE INFECTION CONTROL PLAN

#### 2.1.4 NEGATIVE AIR MACHINES

- A. Negative Air Machine Cabinet: The cabinet shall be constructed of steel or other durable material capable of withstanding potential damage from rough handling and transportation. The width of the cabinet shall be less than 30" in order to fit in standard doorways. The cabinet must be factory sealed to prevent dust from being released during use, transport, or maintenance. Any access to and replacement of filters shall be from the inlet end. The unit must be on casters or wheels.
- B. Negative Air Machine Fan: The rating capacity of the fan must be the air moving capacity under actual operating conditions.

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Manufacturer's typically use "free-air" (no resistance) conditions when rating fans. The fan must be a centrifugal type fan.

A. Negative Air Machine Final Filter:

- 1) When exhausting directly to the outside from a window or penetration the filter shall be a minimum MERV 8 pleated filter media completely sealed on all edges within a structurally rigid frame.
- 2) When exhausting to a exhaust duct: the final filter shall be a HEPA filter. The filter media must be completely sealed on all edges within a structurally rigid frame. The filter shall align with a continuous flexible gasket material in the negative air machine housing to form an air tight seal. Each HEPA filter shall be individually tested and certified by the manufacturer to have an efficiency of not less than 99.97% when challenged with 0.3  $\mu\text{m}$  dioctylphthalate (DOP) particles. Testing shall have been done in accordance with Military Standard MIL- STD-282 and Army Instruction Manual 136-300-175A. Each filter must bear a UL586 label to indicate ability to perform under specified conditions. Each filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.

D. Negative Air Machine Pre-filters: The pre-filters, which protect the final HEPA filter by removing larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. A first stage pre-filter shall be a low efficiency type for particles 10  $\mu\text{m}$  or larger. A second stage pre-filter shall have a medium efficiency effective for particles down to 5  $\mu\text{m}$  or larger. Pre-filters shall be installed either on or in the intake grid of the unit and held in place with a special housing or clamps.

F. Negative Air Machine Safety and Warning Devices: An electrical/mechanical lockout must be provide to prevent the fan from being operated without a HEPA filter. Units must be equipped with an

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automatic shutdown device to stop the fan in the event of a rupture in the HEPA filter or blockage in the discharge of the fan. Warning lights are required to indicate normal operation; too high a pressure drop across filters; or too low of a pressure drop across filters.

- G. Negative Air Machine Electrical: All electrical components shall be approved by the National Electrical Manufacturer's Association (NEMA) and Underwriter's Laboratories (UL). Each unit must be provided with overload protection and the motor, fan, fan housing, and cabinet must be grounded.

**2.1.5 PRESSURE DIFFERENTIAL**

The fully operational negative air system within the regulated area shall continuously maintain a pressure differential of - 0.02" water column. Before any disturbance of any material or building system, this shall be demonstrated to the VA by use of a pressure differential meter/manometer as required by OSHA 29 CFR 1926.1101(e)(5)(i). The Competent Person shall be responsible for providing and maintaining the negative pressure and air changes as required by OSHA and this specification.

**2.1.6 TESTING THE SYSTEM**

The negative pressure system must be tested before any disturbance. After the regulated area has been completely prepared, the decontamination units set up, and the negative air machines installed, start the units up one at a time. Demonstrate and document the operation and testing of the negative pressure system to the VA using smoke tubes and a negative pressure gauge. Testing must also be done at the start of each work shift.

**2.1.7 DEMONSTRATION OF THE NEGATIVE AIR PRESSURE SYSTEM**

The demonstration of the operation of the negative pressure system to the VA shall include, but not be limited to, the following:

- A. Contractor to install Triatek (Web site [www.Ttk.com](http://www.Ttk.com)) negative air isolation monitoring stations at the sites access doors or at opposite sides of the construction area check with COTR for number of units and location.



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- B. Curtains of the decontamination units move in toward regulated area.
- D. Use smoke tubes to demonstrate air is moving air across all areas in which work is to be done.
- E. Plastic barriers and sheeting move lightly in toward the regulated area.

**2.1.8 USE OF SYSTEM DURING CONSTRUCTION OPERATIONS**

- A. Start units before beginning any disturbance occurs. After work begins, the units shall run continuously, maintaining 4 actual air changes per hour at a negative pressure differential of 5.0 Pa (-0.02") water column, for the duration of the work until a final visual clearance and final air clearance has been completed.
- B. The negative air machines shall not be shut down for the duration of the project unless authorized by the VA, in writing.
- C. Construction work shall begin at a location closest from the units and proceed away from them. If an electric failure occurs, the Competent Person shall stop all work and not resume until power is restored and all units necessary are operating properly again.
- D. The negative air machines shall continue to run after all work is completed and until a final visual clearance and a final air, clearance has been completed for that regulated area.

**2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA**

**2.2.1 GENERAL**

- A. Seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All surfaces in the regulated area must be covered to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated, immediately stop work and clean up the contamination at no additional cost to the Government.

**2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA**

- A. Access to the regulated area is allowed only through the personnel decontamination facility (PDF). All other means of

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access shall be eliminated and OSHA warning signs posted as required by OSHA. If the regulated area is adjacent to or within view of an occupied area, provide a visual barrier of opaque fire retardant poly sheeting at least 4 mils thick to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier must be solid and capable of withstanding the negative pressure.

**2.2.4 CRITICAL BARRIERS**

- A. Completely separate the regulated area from adjacent areas using fire retardant poly at least 6 mils thick and duct tape. Individually seal with two layers of 6 mil poly and duct tape all HVAC openings, cap off exhaust into the regulated area. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other objects in the regulated area. Use care with hot/warm surfaces see fig 1.

**2.2.5 PRIMARY BARRIERS**

- A. Temporary Construction Partitions:
  - 1. Install and maintain temporary construction partitions to provide separations between construction areas and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on one side of wood or metal steel studs. Seal with one layers of 6 mil poly for a vapor barrier under gypsum or plywood. Extend the Poly through suspended ceilings to floor slab or roof. Seal penetrations at door openings, install tight-fitting yellow construction doors with self-closing devices see fig. 2 for barrier construction. Contractor to provide the construction(s) door for the project.

**2.2.6 CONTRACTOR SPILL RESPONSE KIT**

- A. The kit should include the following:
  - 1. Shop Vacuum.
  - 2. Multi-Purpose Spill Control Sorbents to absorb nonaggressive liquids up to 30 gallons.
  - 3. Sorbents pillows.

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4. Pipe leak clamps for copper & steel pipe in sufficient size range and quantity base on project piping scope.
5. Bucket & mop and water resistant duct tape.

FIG. 1

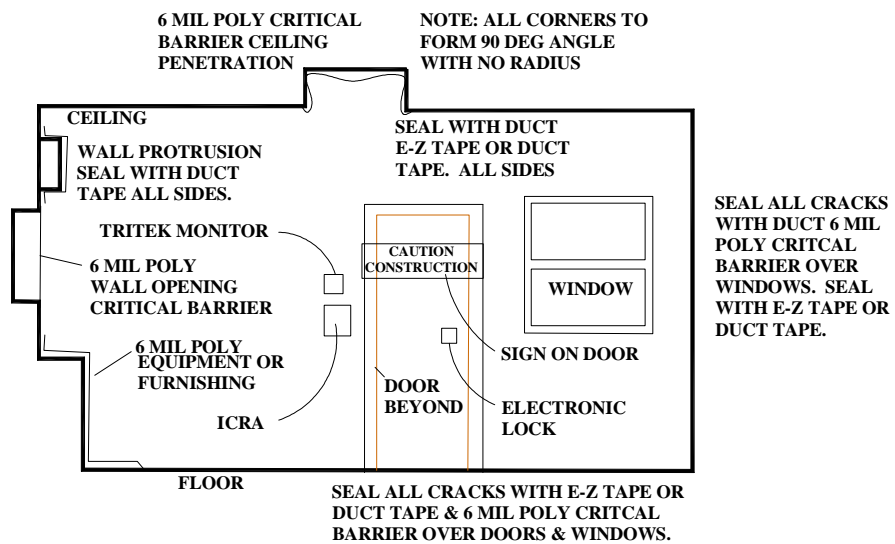


Figure 1

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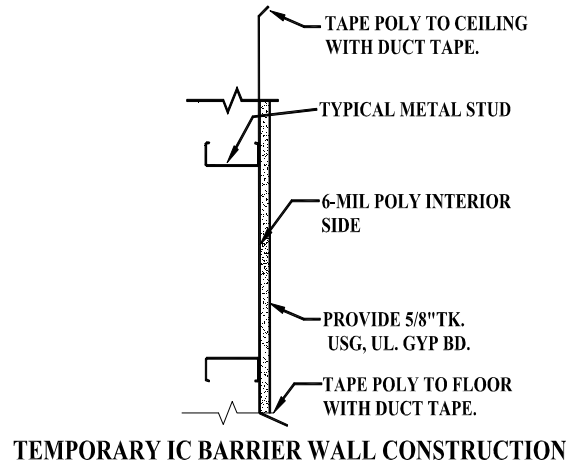
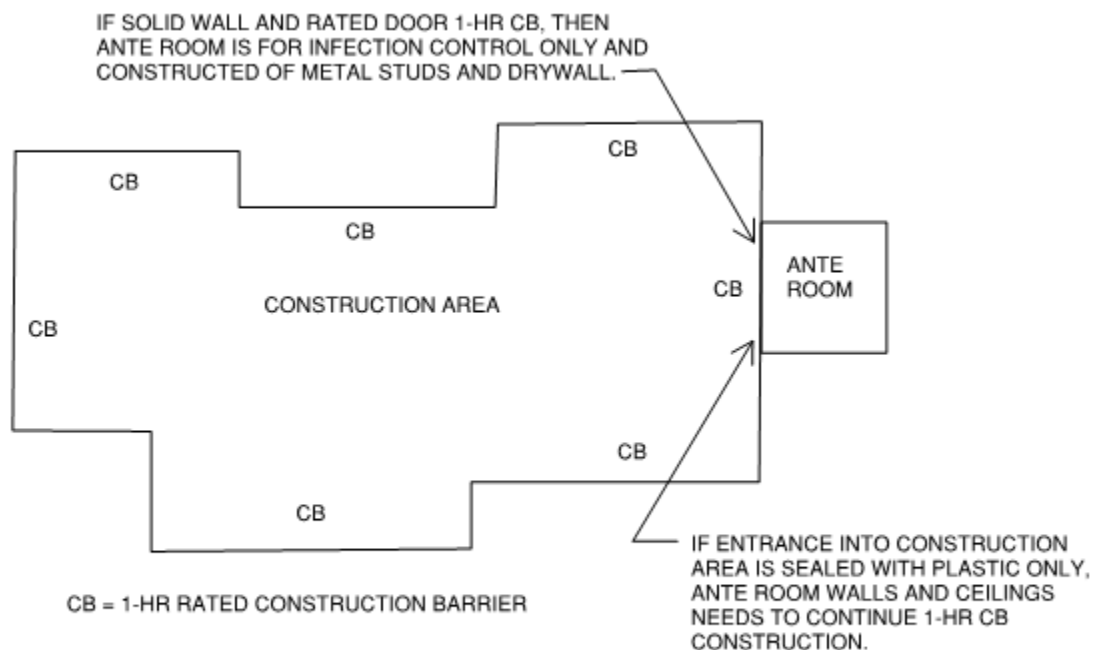


Figure 2

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**CONSTRUCTION AREA TYPICAL PLAN**

Figur

Infection Control Risk Assessment for Construction / Renovation Projects			
Project Name: Re-purpose C-Section basement pool and electrical room building 200		Project Number: 578-15-026	
Project Planner: Kinjal Tailor		Extension: 20921	
Building Number: Bldg.1		Floor(s): First (old Main Library)	
Project start date:		Projected completion date:	
Construction Activity		Infection control risk group	
	TYPE A: Inspection, non-invasive activity, low noise, no vibration DUST LEVEL Low		GROUP 1: Low office areas, FMS areas, all non-patient care areas.
	TYPE B: Small scale, short duration, low-moderate noise, low-moderate vibration DUST LEVEL: Moderate to High		GROUP 2: Medium All other patient care areas i.e. ultrasound, Rehab, Occupational Therapy.
	TYPE C: Requires more than one work shift to complete, low-moderate noise, moderate-high vibration DUST LEVEL Moderate to High		GROUP 3: Medium/High ED, Radiology/MRI, , , admissions, food service areas, laboratories.
	TYPE D: Major demolition and construction activities Requiring consecutive work shifts, moderate-high noise, moderate-high vibration DUST LEVEL High		GROUP 4: Highest Operating rooms, SPD ICU's Outpatient areas, oncology anesthesia, post anesthetic recovery all scope areas, Pharmacy, Renal Dialysis

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Project Class Determination Matrix				
Construction Activity → Risk Level ↓	Type “A”	Type “B”	Type “C”	Type “D”
Group 1	I	II	II	III
Group 2	I	II	III	IV
Group 3	I	III	III	IV
Group 4	III	IV	IV	IV
Contractors Actions by Project Class				
<b>CLASS I</b>	1. Execute work by methods to minimize raising dust from construction operations. 2. Immediately replace any ceiling tile displaced for visual inspection.		3. Contain construction waste before transport in tightly covered containers. 4. Emergency Preparedness training/posting/ID card.	
<b>CLASS II</b>	1. Provide active means to prevent air-borne dust from dispersing into atmosphere. 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tap		4. Block off and seal air vents. 5. Wipe surfaces with disinfectant. 6. Contain construction waste before transport in tightly covered containers. 7. Emergency Preparedness training/posting/ID card.	
<b>CLASS III</b>	1. Isolate HVAC system in area where work is being done to prevent contamination of the duct system. 2. Complete all critical barriers before any work begins. 3. Maintain negative air pressure within work area utilizing HEPA equipped air filtration units. 4. Provide dust mat at entrance and exit of work area.		5. Contain construction waste before transport in tightly covered containers. 6. Wet mop or vacuum with HEPA filtered vacuum before leaving work area. 7. Cover transport receptacles or carts. Tape covering. 8. Emergency Preparedness training/posting/ID card.	
<b>CLASS IV</b>	1. Isolate HVAC system in area where work is being done to prevent contamination of the duct system. 2. Complete all critical barriers before any work begins. 3. Maintain negative air pressure within work area utilizing HEPA equipped air filtration units. 4. Provide adhesive walk-off mat with Provide dust mat at entrance and exit of work area. In the anteroom at entrance and exit of work area. 5. Seal holes, pipes, conduits and punctures appropriately. 6. Vacuum the entire work area with HEPA vacuums or wet mop with disinfectant at the completion of project.		7. Do not remove barriers from work area until completed project is thoroughly cleaned by housekeeping and inspected by the Infection Control Department Safety Section and Engineering Service. 8. Remove barrier materials carefully to minimize spreading dust and debris associated with construction. 9. Contain construction waste before transport in tightly covered containers. 10. Cover transport receptacles or carts. Tape covering. 11. Remove isolation of HVAC system in areas where work was performed at the end of the project. 12. Emergency Preparedness training/posting/ID card.	

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**SECTION 01 01 10 - SN**  
**SPECIAL NOTES**

**PART 1: GENERAL**

**1.1 FIRE ALARM SYSTEM:**

**FIRE/SECURITY ALARM SYSTEMS:** Contractor shall advise the Graphic Control Center and/or the Police Desk at extension 41010/42222 respectively, prior to any work which might result in the Fire Alarm System or Security System (this includes but is no limited to: Smoke Detectors, Water Flow Switches, Pull Stations, Sprinkler Heads, Motion Detectors, Door Contacts, Security Door Controls, etc.) being activated, in addition to having an approved outage form from the Facility Management Department. Notification to Graphics and/or the Police Desk and having an outage form, does not absolve the contractor from following the proper procedures to prevent the system from activating, i.e. covering the smoke heads with paper bags, closing valves, containing dust, monitoring and controlling security devices, etc.). If any system activates due to the contractor's failure to notify the Graphic Control Center, the Contractor's failure to follow proper procedures, or the Contractor's failure to obtain an outage form, a Modification/Settlement by Determination deduction of \$2500.00 per alarm/event or notice from the Police that a construction area was left unsecured will be issued to the contractor.

**1.2 SCHEDULING OF WORK:**

- A. Contractor shall verbally schedule work areas with Resident Engineer not less than fifteen (15) calendar days in advance of commencement of work. Verbal notification shall be backed up and verified in writing.
- B. Contractor shall verbally schedule outages or service interruptions with Resident Engineer not less than fifteen (15) calendar days in advance of intended commencement of work. Notification does not guarantee the date of scheduled outage or service interruption however Resident Engineer will schedule such dates and inform the contractor. Date will be scheduled with medical center personnel when service interruption will minimize affect to hospital patients and operations. Contractor to submit VA System Outage Request form to Resident Engineer not less than fifteen (15) calendar days in advance of intended commencement of outage work. Contractor to attend (2) weekly pre-outage meetings with Engineering and staff to coordinate actual date of outage, duration, time of outage, phasing, and affected services. In addition, contractor to attend the pre-outage meeting one hour prior to outage to coordinate communications, readiness, pre-

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outage checklist, document requirements, temporary measures, lock out tag out and other outage requirements and procedures.

C. Contractor to attend weekly construction meetings.

**1.3 PROTECTION OF WORK AREAS:**

Contractor to provide drop cloths when working in occupied areas to avoid staining or damaging existing carpets or vinyl tile floors.

**1.4 HOURS OF WORK:**

A. The hours of contract work shall be from 7:00 a.m. until 4:30 p.m. the normal work shift for hospital employees, the contractor shall verify shift or shifts required for construction areas. Other than normal, after (off) hours, including federal holidays shall be scheduled two days prior to starting with the Project Manager. These off hours will be required to complete the project in the time allotted for the contract at no additional cost to the Department of Veterans Affairs. Upon approval of the Department of Veterans Affairs, the contractor will propose the scope or extent of off hour work due to individual contractor resources available to accomplish this project in the time allotted. In addition, these off hours will be required for utility/service interruptions, and any/other work that may interrupt the operation of the occupied space, i.e., some road construction, demolition, work in occupied areas, work affecting occupied areas, etc. Some noise producing demolition operations will be required to be scheduled for off work hours as directed by Resident Engineer and described on drawings.

B. Certain work items, which require off-hour work, have been identified. These items are indicated on the drawings. Refer, in particular, to Phasing Notes on Drawings. All drawings shall be reviewed for off-hour work requirements and items creating disturbance to the hospital staff or patient care must be performed during off-hour working periods as established and approved by the VA Engineer.

C. Building will be occupied during performance of work, but areas of alterations will be vacated. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction areas, which serve as routes of access to such affected areas and equipment. Coordinate alteration work in areas occupied by the VA so that



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Medical Center operations will continue during the construction period. Contractor to construct 7 feet tall by 5 feet wide metal stud and drywall tunnels through occupied space as deemed necessary by the VA for access by Medical Center personnel and maintaining construction operations.

**1.5 SUBMITTALS:**

A. Start of Construction: The contractor submittals must be forwarded in sufficient time to permit proper consideration and approval by the government and be timed to permit adequate lead time for procurement of contract required items. Delivery of submittals to the COR or verbal acknowledgement of receipt by the Project Manager **does not** constitute approval.

B. Sole Source Items: There will be no substitutions for the products and services listed below.

Sole source items to be in accordance with VAAR 852.236-90  
Restriction on submission and use of equal products.  
This clause applies to the following items:

<u>System / Equipment</u>	<u>Manufacturer and Model</u>	<u>GSA No.</u>
Fire Alarm System	Simplex fire alarm	GS-06F-0033P
Security System and Code Blue	Johnson Controls Pegasys System	GS-07F-7823C
Medical Gas Alarms	Puritan Bennett	
Isolation Room Controls	Employ Critical Room Control	Not on GSA
Doors, Hardware, Locks and Keying	Employ Best Patented cylindrical and mortise sets with SFIC Small format interchangeable core. Medeco 7-pin interchangeable cylindrical cores, LCN Closures (Mechanical, Low Energy, High Energy, Electronic Hold-Open, Electromagnetic), Von Duprin Exit Devices, Hager Hinges.	GS-07F-5835R
Building Automation and HVAC Controls	Johnson Controls system(Tridium Niagara	GS-07F-7823C

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Refrigerator	System)	
Temperature Controls	Johnson Controls Temp Trak System	GS-07F-7823C
Modular Furniture	Herman Miller Products	GS-28F-8049H
Modular Brick	Belden Brick (County Materials) Seal Brown Velour A, Modular Brick	
Automatic Transfer Switches	Eaton Magnum Transfer Switches or ASCO Automatic transfer Switches)	
Electrical Metering	Eaton/Cutler Hammer PowerXpert system	
Interiors	Reference Interior Schedule	
Tile Grout Sealant	Permatect Microguard Inorganic Protective Barrier	
Stone Flex Aggregate Panels	CEP Panels, Inc., Bermuda White SN 100, Fine Grade Aggregate Finish	
Firestop Systems	HILTI Firestop Systems	

**1.6 EMERGENCY SERVICE: (NOT USED)**

**1.7 KEYS:**

- A. Keys for access to construction/work areas may be issued to the contractor at the discretion of the Project Manager. Up to three sets of keys will be provided at no cost. Additional keys will be provided for a charge of \$5.00 per key, payable by check to the Department of Veterans Affairs. All keys issued will be signed for and issued to the General Contractor. Upon completion of the work, failure to return all issued keys to the Project Manager will result in the issuance of a Settlement by Determination in the amount of \$100.00 for each outstanding key. In addition, a \$5.00 fee will be paid to VA for each outstanding key. Keys will be provided through the FM SAM Box. Keys are to be picked up and returned daily. If keys are not

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returned by the end of the day, a modification of \$5.00/key per day will be assessed against the contractor.

**1.8 SAFETY ITEMS:**

A.Training:

- a. All employees of contractor and subcontractor shall be aware of the egress routes from the construction areas. It is the contractor's responsibility to ensure all employees are aware of the fire alarm codes for the building they are working in and participate in fire alarm drills and actual fire alarms.
- b. Project Site Superintendent shall have the 30-hour OSHA certified Construction Safety course.

B.All employees of general contractor or subcontractors shall have the 10-hour OSHA certified Construction Safety course.

C.Submit training records of all such employees for approval before the start of any work onsite.

D.Barricades: The contractor is responsible to erect barricades, construction and safety signs, and new egress routes. The barricades will be erected to restrict areas where hazardous operations are performed. The construction and safety signs shall consist of caution signs as determined and approved by VA; egress signs, where egress has been altered for construction; and any applicable hazardous warning signs. If the egress is changed due to construction, the contractor shall provide temporary directional signs for changes as determined by VA and for construction of any walkways, steps, or overhead protection scaffolding or the like as required providing a new means of egress. Emergency egress plan shall be developed by the contractor and submitted for approval by the designated VA safety manager before egress routes are altered.

Fire Extinguisher: The contractor and subcontractors shall provide fully charged and fully operational fire extinguishers as required and in accordance with section FSS on the job site(s) at all times.

Reference section 01 01 10 FSS.

E.Debris: Combustible storage and debris shall be kept to the lowest level necessary for required daily operations. The construction area shall be kept clean as indicated in general requirements and conditions

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- F. Gasoline Powered Equipment: Gasoline powered equipment shall not be used within the confines of any building on the Medical Center without specific written permission from the Chief, Engineering Service.
- G. Fire/Smoke Doors: Fire and/or smoke doors shall not be propped open or prevented from closing and latching. This includes mechanical equipment rooms and utility closet doors.
- H. Construction Hard Hats: General Contractor to provide (4) sets of hard hats and safety glasses for each worksite for VA staff use.
- I. Exit Signs:
  - a. Inside Construction Space: Contractor to provide luminescent Exit Signs throughout the construction space such that while standing in any place within the construction space, an Exit sign is visible and the path of egress can be followed.
  - b. Outside Construction Space: Contractor will cover, relocate, etc. Exit signs impacted due to their construction operations as directed by the ILSM and the VA Safety Officer.

**1.9 SECURITY OF CONSTRUCTION SITES - Contractor Regulations**

- A. All construction sites must be secured to prevent inappropriate access by patients, visitors, and employees. While such security fences, doors, and barricades are temporary, they must be substantially installed to control access to the site. The existing security (Pegasys by Johnson Controls and Ingersoll Rand) system must be extended to each construction access door. Each construction door must be provided with an Ingersoll Rand Integrated Reader Lock programmed to the existing VA security system. Construction sites and all security measures must be monitored daily to ensure that security is maintained. Local VA Police must be alerted about the construction project. At the close of activity daily, before securing the site or portions of the site, the contractor must ensure that there are no patients, visitors, or staff in the area. If construction site problems arise, the Contracting Officer and COR will take appropriate action to correct any and all safety and security conditions.
- B. VA engineering, safety/fire department, and police staff must have the right to access the construction site as needed to perform their assigned responsibilities.

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- C. Lock up the worksite at all times to prevent patients and other unauthorized people from entering the site.
- D. The need for job site security is much greater when work is being conducted in psychiatric areas to protect the safety of the patients. All job boxes, tools, etc., must be locked up even when workers are on site unless there's enough activity to assure that patients cannot access tools or site. Verify that no one is in the construction area upon locking up the site for the evening.
- E. Two evacuation routes from the worksite must be maintained at all times.
- F. Contractors may lock up their tools etc., with personal locks.

**1.10 PENETRATIONS:**

**A. WALL:**

- a. All wall and/or floor penetrations created by work on this contract, whether by demolition or new construction, shall be patched by the general contractor or as assigned by the general contractor. All penetrations and work above ceiling will require an 'Above Ceiling Permit' issued by the COR/Engineering". All patching materials shall be of like kind or a suitable substitute approved by NFPA or UL.
- b. ONLY (1) one type of fire sealant is permissible per hole.
- c. The permit will be in this person's possession while all inspections and/or work are being performed.

**B. CEILINGS:**

- a. To ensure that proper ceiling penetrations are sealed, all internal departments and contractors doing any cabling, wiring, plumbing, etc., must obtain a ceiling access permit from Facilities Services prior to installation.
- b. All wall penetrations must be located, marked, and sealed by contractor responsible for penetration. As penetrations are sealed, Facilities Service must be contacted to inspect penetrations for proper sealing.
- c. The permit will be in this person's possession while all inspections and/or work are being performed.

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- d. At the end of each work day and prior to leaving work site, the contractor shall replace all ceiling tiles temporarily removed to do work above finished ceilings in corridors.
- e. If it is not practical to replace all ceiling tiles on a daily basis the contractor is to construct 7 feet tall by 5 feet wide metal stud and drywall tunnels through occupied spaces as deemed necessary by the VA for access by Medical Center personnel and maintaining construction operations. Upon the first incident of the contractor not replacing the ceiling tiles, this tunnel construction will have to commence immediately prior to any further construction on the project.

C. Reference section 01 01 10 - 1HR for additional information.

**1.11 PHASING AND WINTER CONDITIONS:**

Phasing on this contract is critical as portions of the area to be remodeled shall remain occupied throughout the construction work. Contractor will be working in an operational hospital and not be provided designated elevators or entrances. The contractor will share the corridors, the B-Bank elevators, loading dock, etc. with staff, patients and other contractors. Each phase shall be as described on the drawings and/or specifications shall be completed in the sequence described. Also refer to Section 01 00 00, Article 1.6.G. Phasing.

Cold and Extreme Heat Weather Construction. All construction shall have provisions for cold weather or extreme heat conditions regardless of solicitation date, construction award date, anticipated notice to proceed, and duration. Provisions are identified and defined but not limited to each specification section and drawings. Contractor to provide necessary means and methods required to accommodate cold weather or extreme heat construction conditions.

**1.12 SCAFFOLDING:**

Prior to setup of all scaffolding, the contractor is to provide a submittal of the scaffolding design through the submittal review process. The scaffolding design is to be stamped by a professional engineer. Contractor is to provide copies of daily scaffolding inspections with daily logs.

**1.13 ENERGY EFFICIENCY REQUIREMENTS:**

A. All design and installation will be in accordance with current VAMC, HVAC design guides, NEC, NFPA, ASHRAE 90.1, state, local and all VA and federal codes.

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B. The VA intends to provide energy savings equipment and design modifications for current energy usage to the most efficient and economical level possible.

**1.14 INSPECTIONS:**

All mechanical and electrical work shall be inspected by Engineering Service (Shop & Resident Engineer) personnel prior to being put into operation or closing up if work will be hidden by walls, ceilings, drop ceilings, cover plates, access panels, etc. Contractor shall notify the VA RE a minimum of two days prior to the inspection date, times and dates shall be scheduled and agreed upon by VA. Installations will be inspected by these VA personnel for work in compliance with State, Federal, Local, Dept. of Veterans Affairs Codes, regulations and contract specifications. If corrections, alterations, adjustments, new construction etc. is required, the VA will be notified within 48 hours of completion of such items. These inspections and corrections, alterations, etc. will be made at no additional time or cost to VA.

**1.15 CONTRACTOR'S AGREEMENT - RULES AND REGULATIONS FOR ALL CONTRACTORS**

The following is the contractor's agreement required to be signed at the pre-construction meeting and updated monthly when new subcontractors start working on the job site. The agreement is the general contractor's responsibility to ensure all subcontractor personnel are trained and acknowledge (sign) the agreement.

**A. STANDARD POLICY**

- a. All outside General contractors and Sub-contractors will coordinate all work within the hospital with Facilities Management before beginning work.

**B. PURPOSE**

- a. General Contractor will ensure that each individual General Contractor and Sub-Contractor employee is responsible for complying with established hospital standards, applicable OSHA Safety Requirements, federal, state and local environmental regulations, wearing prescribed safety equipment, and preventing avoidable accidents.

**C. PROCEDURE**

- a. General Contractor will ensure that each individual general contractor and sub-contractor employee review, understand and acknowledge (sign) the following information prior to the commencement of work scheduled at this facility. General Contractor will forward copies of signed acknowledgements to Project Engineer of all new employees on a monthly basis.

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**The following building rules and regulations affect all contractor personnel, suppliers, and vendors:**

**D. Access to Construction Areas**

- a. Access is limited to areas such as critical care and surgical units, as well as mechanical/electrical rooms, etc. Access can be obtained through Facilities Service.
- b. Access to any floors of the facility after normally scheduled work hours (Monday-Friday, 7:00 a.m.-5:00 p.m.) must be scheduled in advance with the Project section of Facilities Service. Police and Security reserves the right to refuse access to anyone without prior authorization and identification.
- c. Ready access for the Engineering, Safety, Police and (the Fire Department) shall be maintained to all areas under construction at all times.
- d. Areas under construction shall be locked during off-hours. Keys and cylinders for this purpose are obtained through Facilities Service. Contractors will not put their locks on any doors without VA approval.

**E. Accidents and Injuries**

- a. First Aid/Medical Aid/Emergency Treatment for workers: The contractor must post emergency phone numbers and treatment facilities if any contractor employees are injured on the job, or need medical treatment
- b. Work site injuries must be reported to the VA. The VA has an accident reporting form (form number 2162). The COTS/ Safety/ or Security and Police Service will initiate the 2 162. Once the VA has completed the supervisor's portion the injured individual will be required to complete the narrative portion of the report. The service chief responsible for the contract is also required to sign the report and forward the original report to the Safety Section.

**F. Asbestos**

- a. There are both friable and non-friable asbestos-containing materials located within the hospital complex. Inspection reports are located in the Facilities Service Department. Contractors are required to be aware of the asbestos materials located in the vicinity of their work. Further, all contractors are expressly forbidden to disturb any asbestos-containing materials unless specifically authorized in writing by VA. Under no circumstances are any



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materials supplied or installed by the contractor to contain asbestos in any form or quantity.

- b. Asbestos removal contractors will be trained and licensed, and will follow all OSHA rules, VA specifications, state and local regulations from notification to disposal.
- c. A VA representative will verify the adequacy of the barriers and ventilation before any asbestos removal work is conducted.
- d. The contractor is responsible for monitoring his own employees' exposure to asbestos.
- e. Additional specific asbestos removal specifications will apply.
- f. Contractor to provide a Fiscal Year breakdown of Asbestos Costs on the project.

**G. ACM TRACE WORK OPERATIONS**

- **ACM TRACE RESULTS** - Should renovation activities deem the material friable due to cutting, grinding or other mechanical means of removal, an employer is bound by OSHA 29 CFR regulations 1926.1200 (d) (5) (iv) to protect their employees. This may determine that removal of the materials be performed by asbestos abatement workers trained in 29 CFR 1926.1101.

*\*OSHA regulation 1910.1200 HAZARDOUS COMMUNICATION Section (d)(5) Hazard determination "...employer shall determine the hazards of mixture of chemicals as follows: (iv) "If the...employer has evidence to indicate that a component present in the mixture in concentrations of less than one percent...could be released in concentrations which would exceed an established OSHA permissible exposure limit...or could present a health risk to employees in those concentrations, the mixture shall be assumed to present the same hazard."*

- **General Summary:**
  - 1. Employees, contractors, etc. must be warned about the presence of asbestos.
  - 2. The contractor must have a competent person on site during work. (At a minimum, it should be a trained, certified asbestos supervisor).
  - 3. Personal exposure assessments (negative exposure assessment) are required (PCM analysis) and workers should begin work with PPE.
  - 4. Wet methods and daily clean up and sealing waste in leak tight containers are required. The following is a list of references from OSHA guides. Note: The reference to the word "sheet rock" is based on trace (<1%) of asbestos being present in the "sheet rock."

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- The contractor will be responsible for proper work practices and prohibitions for all construction activities involving material that contains any amount of asbestos regardless of the exposure levels. And the standard has exposure-based requirements, consisting of a 0.1 fiber/cc 8-hour TWA PEL and a 1 fiber/cc 30-minute excursion limit, and other requirements that apply whenever worker exposures exceed either or both of the limits, regardless of the amount of asbestos contained in the materials involved.
- If some of the items associated with the installed sheetrock contain some asbestos but none of them contain >1% asbestos, then removal of the sheetrock is considered unclassified asbestos work. This means that only certain ones of the standard's work practice and engineering control obligations, and prohibitions pertain. Some of the general ones do not pertain because they apply to installed building materials containing >1% asbestos (ACM). How many of the eligible general work practice and engineering control obligations, and prohibitions are applicable depends on whether the employee levels of exposure to airborne asbestos exceed either of the asbestos PELs. In further explanation: These OSHA references are specific to this issue.
- If the employees' asbestos exposures exceed neither asbestos PEL, then only two of standard's general work practice control procedures and three of the standard's general prohibitions pertain to the sheetrock removal operation; none of the standard's engineering control methods pertain to the sheetrock removal operation. Those general work practice procedures and general prohibitions the employer must observe under such a condition are those presented at:
- 29 CFR 1926.1101(g)(1)(ii), which requires: wet methods, or wetting agents, to control employee exposures during asbestos handling, ... removal, cutting, ... and cleanup, except where employers demonstrate that the use of wet methods is infeasible due to for example, the creation of electrical hazards ... [and] equipment malfunction...; 29 CFR 1926.1101(g)(1)(iii), which requires: prompt clean-up and disposal of wastes and debris contaminated with asbestos in leak-tight containers...; 29 CFR 1926.1101(g)(3)(i), which prohibits: high-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air; 29 CFR 1926.1101(g)(3)(ii), which prohibits: compressed air used to remove asbestos, or materials

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containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air; and 29 CFR 1926.1101(g)(3)(iv), which prohibits: employee rotation as a means of reducing employee exposure to asbestos.

**H. Clean-Up**

- All work activity within occupied portions of the facility shall be immediately cleaned and restored to its original finished condition upon completion of the activity. If the activity continues into the next workday, the area shall be left safe, clean, and presentable.
- Public restrooms are not to be used for the cleaning of tools or equipment, i.e., paintbrushes, rollers, finishing tools, etc. Janitor's slop sinks are available for this purpose. If janitor's closets are used, they must be cleaned.
- Trash, combustible waste, and excess construction materials must be removed daily to prevent accumulation. Contractors must arrange for the removal of their debris and waste.
- All work for an area must be confined within that space. Public corridors, stairwells, equipment rooms, and vacant floors are not to be used for the storage of materials or as a workshop. Tracking of construction dirt into the public corridors or stairwells must be prevented. The contractor will provide dampened walk-off mats at all entrances and exits from the construction area.
- If smoke detectors are covered during dust-producing activities, they must be uncovered daily.

**I. Compressed Gas Cylinders**

- Compressed gas cylinders are very dangerous if not treated properly.
- Employees who work with compressed gas cylinders must have specific training.
- Make sure that they are secured properly when in use or in storage.
- Always keep the caps on the cylinders when they are not in use.
- See also Hot Work section.

**J. Confined Space**

- Confined Space Entries. All Confined Spaces are clearly marked on campus. NO ENTRY is allowed in the areas without prior approval by the Project Engineer. NO ONE will be allowed to enter these areas without the proper

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qualifications, equipment and training as required by the OSHA Standards (29 CFR 1910.147)

- Identify storm sewers, underground electrical vaults, and all other areas that require confined space permits. (e.g., a map showing the locations of all the confined spaces located in the Facilities Service Department).
- All hospital personnel that would require entry into these spaces must abide by the Confined Space Program Procedure.
- It is the sole responsibility of any outside contractor doing work on a VA Medical Center campus to coordinate entry into any of these spaces or any other marked permit required confined spaces with the medical center.
- Anyone entering a permit-required confined space must follow Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR 1910.120.
- Contractor to submit as a formal submittal the Confined Space Entry program (and CSE Permit if needed).

**K. Contractor Room/Space Guidelines:**

- Materials will be kept on the job site, in the contractor's room or in storage space provided by the Contractor via trailer located in the VA corporation yard on the North East section of the VA grounds.
- Any shared space within storage room(s) must be accessible to Facilities Service. Do not block access to electric panels or fire protection equipment.
- Hallways are not to be used for storage.
- Contractors will manage the area and assure the site is kept clean and safe. (OSHA standards apply.)
- Any disputes or concerns will be directed to the Facilities Service Manager.

**L. Damage by Contractors**

- Any damage caused by the contractor's employees is to be reported to the COR or Facilities Service Project Section immediately.

**M. Deliveries**

- All material deliveries at the loading dock must be coordinated with the Receiving Department in advance.

**N. Dress Code**

- All personnel must be appropriately dressed for their work. T-shirts or garments with obscene or suggestive messages are not permitted. Personnel found improperly dressed will be asked to leave the facility. No construction staff is allowed to

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remove shirts or other clothing. No articles may include offensive statements/graphics.

O. Dust Barriers and Ventilation Requirements

- Reference section 01 01 10 IC.
- Dust barriers are needed to protect occupied areas on any portion of the job that has potential to create dust.

P. Elevator Usage

- Contractors shall not hold or block from use any public elevators in any building unless authorized by the COR.
- Contractors shall use "B" bank freight elevators only for the delivery and transportation of materials and demolition materials. Contractors shall not hold or block public elevators from use in any building. .

Q. EMERGENCIES

**Fire Plan - There is no difference between a fire drill and an actual fire.**

**General Contractor will ensure that each employee on the worksite knows where the pull stations are in the areas you are working.**

**If you are in the area of the fire:**

- R    Rescue anyone from the area if necessary**
- A    Pull the nearest Pull Station**
- C.    Contain the fire by closing all doors in the area**
- E    Extinguish if possible or Evacuate the area immediately**

**If you are NOT in the area of the fire:**

**Construction Workers are to cease activities, stay in place, and wait for further instructions or cancellation of the fire drill.**

**DO NOT move through the hospital. DO NOT use the elevators or stairwells.**

- Medical Emergencies - Any contractor who witnesses a medical emergency is to pick up a nearest phone and dial "911" or the operator and describe the condition of the emergency.

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- Accidents/Injuries - The contractor must post emergency phone numbers and treatment facilities for any injured employee.
- Worksite injuries must be reported to the VA immediately using the VA accident reporting form (Number 2162). The COR/Safety/or Security and Police Service will initiate the 2162.
- Patients and visitors may be anxious or irritated because of their situation. If you are faced with any patient or visitor that gets aggressive with you, simply call Ext. 42222 and say "Code Green" and describe the situation. Security will respond immediately.

**R. Equipment Safety**

- Ladders are not to be left unattended in public areas during breaks and lunch hours. Ladders shall be laid down and placed out of traffic areas during these periods.
- No tools, carts, ladders or other equipment are to be left unattended outside a secure area.
- Yellow safety barricades must be used when working in public areas.
- Use of hospital equipment is permitted only if the contractor receives permission from Facilities Service and is properly trained on the USC of the equipment.

**S. Equipment and Supplies**

- Caution must be used with all flammable materials, i.e., adhesives, thinners, varnishes, etc.
- All paints shall be low odor latex paint. The contractor will use odor reducing agents in all paints and solvents. Ventilation will be required if toxic or foul-smelling materials have to be applied.
- Only a one-day supply of paints, oils, and gas cylinders is permitted within the facility, unless it's properly stored in a flammable liquid storage cabinet.

**T. Fire Alarm System**

- Care must be exercised to prevent the accidental tripping of smoke detectors or fire alarms.
- Notify Facilities Service of your activities and location.
- Cover and protect the smoke alarms with paper bags when raising dust or creating smoke in short duration (less than 3 days) ancillary work areas. All other construction areas to follow section 01 01 10 - 1HR. (You must inform Facilities Service Fire Department when bagging smoke alarms.)

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- Remove the paper bag upon completion of your work and at the end of each workday.
- If you accidentally trip an alarm, notify Facilities Service (Fire Department) immediately.

U. Hazardous Materials and Waste

- A listing of all hazardous materials that will be used on the job and their material safety data sheets (MSDS) will be provided to the VA before the chemicals are used.
- Any excess or used chemicals will be removed from the hospital promptly and properly disposed of by the contractor in accordance with federal, state and local regulations.
- Any hazardous waste generated at the facility must be properly contained and labeled and stored in accordance with local, state, federal and hospital regulations.
- Do not store flammable materials in the facility unless stored in an approved non-combustible storage cabinet or prior approval by the Project Engineer and Safety Office.

V. Heavy Lifting

- Hoisting heavy materials/items require prior review by the Project Engineer.

W. Housekeeping

- Housekeeping in public areas of the hospital will be maintained at the highest level, even while work is on going.
- In secured areas, housekeeping will be performed as needed, but at a minimum at the end of each job task, and at the end of the workday.
- Debris and waste will not be allowed to accumulate on the work site and disposal must be arranged to keep the amounts low.

X. Hot Work Permits

- Hot work permits are required before cutting, soldering, welding operations begin. Before any cutting, soldering or welding is conducted, the contractor or sub-contractor shall obtain permission through a hot work permit. The contractor shall be responsible for obtaining the hot work permits from the Project Engineer.
- Gas and oxygen canisters shall be properly chained and protected and two 10-pound fire extinguishers shall be present.
- A fire watch shall be maintained on the worksite during the hot work operations, and for 30 minutes after the hot work is completed.

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**Y. Identification Badges**

- ID Badges are required for all contractor employees working at the V.A.
- Before beginning work on any project, all outside contractors shall check obtain a VA contractor badge from the Police / Security Desk and obtain a contractors I.D. badge. The Contractor will complete the badge application and email it to the COR, who will forward to the Police. The contractor will stop at the Police Desk 1-2 days later to complete the badge process. VA contractor badges are required for all contractors and consultants who will be onsite for more than (3) total days of the project. Temporary badges will be provided to the GC for contractors onsite for less than (3) days. The outside contractor will supply the following information: location of work site, authorization, duration, and any pertinent information that is required.
- All contractors working at the Hines VA will be finger printed and the finger prints processed prior to obtaining a VA badge. There is an approximate 5 day wait once finger prints are given to when processed and the contractor can return to obtain the photo ID badge. Badges will be active for only 90 days at a time.
- General Contractor will be required to request, thru the COR, for reactivation/continued activation of all contractor badges every 90 days.

**Z. Infection Control**

- Reference section 01 01 10 IC.
- Sensitive/High Risk areas of the hospital require extra precautions to assure patient safety. These areas include but are not limited to the operating rooms, intensive care units, chemotherapy and transplant units. Contact infection control for other areas that may require special precautions.
- When working in patient care areas, please be sure to read and follow the directions listed on any Infection Control Precaution sheets posted outside of a patient's room. Generally this means permission must be obtained from Nursing staff before entry.
- Temporary walls or dust barriers are required to enclose areas under construction.
- Under some circumstances it may be necessary to block return and supply ducts, and install special HEPA exhaust ventilation from the worksite. There should be no re-circulation of air from construction area to rest of hospital.
- Dampened walk-off mats must be located outside of construction area.



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- Dust mops/wet mops must be available to remove any dust tracked outside barriers.
- *Standard Precautions* assumes that any person may carry a contagious disease. In order to protect you from these diseases always assume blood, non-intact skin, mucous membranes and all other body fluids and excretions are infectious. Do not touch any such materials but contact a VA employee immediately. Needle container boxes are provided for the disposal of syringes and other sharps used in the medical center. These must be properly disposed of and should be moved only by VA personnel. The VA Medical Center provides written guidelines, education, and personal protective equipment (PPE) for anyone working at VA Medical Center campus to prevent their exposure to bloodborne pathogens.

AA. Interim Life Safety

- The hospital will document whether and to what extent Interim Life Safety Measures will be implemented for each project.
- VA Safety will ensure what interim life safety measures (ILSM) are required by the General Contractor to temporarily compensate for the hazards posted by existing Life Safety Code (LSC) deficiencies or construction activities in areas of the Medical Center.
- Implementation of ILSM will be required in or adjacent to all construction areas and throughout buildings with existing LSC deficiencies, ILSM applies to both construction workers and affected hospital employees, and will be implemented upon construction development and continuously enforced through construction completion.
- Almost always, Interim Life Safety Measures will require walkthrough inspections by the job foreman, the project manager, and safety staff at varying intervals.
- Training of workers and any affected staff will always be a significant part of the
- Interim Life Safety Measures procedures.

BB. Life Safety

- Any life safety code violations incurred during construction or renovation must be resolved and will result in close coordination with Project Engineer and Safety Section to implement the hospital's Interim Life Safety Measures. These measures are required by JCAHO and NFPA.

CC. Lock Out/Tag Out

- Lock Out/Tag Out - No contract worker is allowed to change the status/position of ANY switch, valve or any other energy source without prior approval from the Project Engineer. All

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Lock out/Tag Out activities need approval prior to being implemented. Any activity requiring a Lockout/Tagout process must comply with the hospital policy.

- Per OSHA Regulation 29 CFR 1910.147, all contractors must comply with OSHA's Safety Lockout/Tagout procedures.
- Coordinate all shut downs with Hospital Personnel.
- Only VA staff is authorized to shut down utilities unless permission is specifically granted.
- Contractor to submit as a formal submittal the Lock Out / Tag Out Program policies and procedures.

DD. Safety Data Sheets (SDS)

- Formerly called Material Safety Data Sheets (MSDS)
- SDS must be provided for any hazardous materials that you will be shipping or delivering to the VA Medical Center.
- SDS are available for all materials used in the medical center. Contact the COR if you need an SDS for a VA owned material.
- See also Hazardous Materials and Wastes.

EE. Noise

- All core drilling, chipping, and hole drilling shall be done at a time and day determined by occupants on that floor and the floors above and below. The COR shall coordinate and approve it.
- The patients, visitors, and staff deserve consideration and the quiet enjoyment of their premises. Anyone found being loud, rude, or otherwise annoying to the patients, their guests, or staff will be asked to leave the facility. Use of vulgar language will not be tolerated.
- All work activity within occupied portions of the facility shall be accomplished with minimal disruption to the patients, physicians, visitors, and staff.
- The playing of radios, tapes, and CD players is not permitted in any occupied area. "Walk-man" radios/tapes/CD players are not permitted anywhere.
- The playing of radios, tapes, and CD players is permitted in vacant areas but shall not be heard outside the vacant area.
- In inpatient areas, coordinate construction activities and debris removal with the Nurse Manager or Charge Nurse to minimize disruption.

FF. OSHA Compliance

- All contractors are subject to Occupational Safety and Health Administration (OSHA) regulations, these standards and are expected to enforce these standards in the performance of

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their work, OSHA regulations can be found in chapter 29 of the Code of Federal Regulations (CFR). Failure on the part of any contractor employee to comply with these standards and/or conduct their work in a safe fashion will result in an interruption in the work schedule for which the contractor will be solely responsible. Any contractor found deviating from regulatory standards and/or policy and SOPS will immediately be issued a stop work order and will be responsible for contractual conflicts related to the work stoppage.

GG.        Parking

- Facilities Service Project Section will designate parking. Contractors may not block fire lanes or other roadways. Violators will be ticketed. During large construction projects, a staging site may be available for parking to contractors.
- All Contractors who need parking must contact Facilities Service for a parking permit.
- If special parking is required, permission shall be granted and coordinated through Facilities Management. Contractors should park in the designated Visitor parking areas. Limited loading and unloading will be permitted at the loading dock area, afterwards contractor employees will be required to park in designated areas.

II.        Patient/Visitor Privacy

- Patient/Visitor Privacy. No construction staff is allowed to review, acknowledge or move any patient information or records.
- No construction staff may acknowledge any patient or visitor unless spoken to - even if the individual is known on a personal basis.
- Radios are NOT allowed on campus.
- Cell phones are to be used only in designated areas.

JJ.        Personal Protective Equipment

There are many situations that require specific personal protective equipment for worker safety according to OSHA. It is the responsibility of the individual contractor to know when it is to be used and is responsible to wear them.

KK.        Restroom Usage

- Contractors are to use public restroom unless otherwise instructed to specific restrooms or portable facilities.

LL.        Requests for Information

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- All contractor requests for assistance and information shall be addressed to the Facilities Service Project Section or Facilities Service Department.

MM. Safety Regulations

- Contractors are expected to comply with all Occupational Safety and Health Administration (OSHA) regulations, 29 CFR 1926 and 1910.
- Work that is performed within a corridor or occupied space must be confined by dust barriers or non-combustible partitions.
- Appropriate job signs and barricades are to be placed in the area of construction to prevent occupants from straying into the job site.
- Stairwell doors shall not be propped open or blocked at any time. Equipment cannot be stored in the stairwells.
- All contractors are encouraged to frequently review these guidelines with their employees and/or subcontractors on site (e.g., during weekly Tool Box Safety Meetings).
- All contractors and their subcontractors are responsible for complying with these guidelines and all other conditions, OSHA requirements, and safety regulations.

NN. Scaffolding

- Prior to setup of all scaffolding, the contractor is to provide a submittal of the scaffolding design through the submittal review process. The scaffolding design is to be stamped by a professional engineer.
- Contractor to provide copies of daily scaffolding inspections with daily logs.

OO. Smoking

- The Smoking policy of the hospital is no smoking in any building nor within 50 feet of any the building entrance and only in areas designated for smoking. All construction employees must comply with this policy. A copy of the hospital smoking policy will be supplied at the pre-construction conference.
- Violation of the smoking policy will result in the worker being removed from the worksite for the duration of the project.
- The designated smoking areas are: Smoking Shelter located outside the East entrance
- Job site supervisors will enforce this smoking policy.

PP. Stop Work

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- The hospital safety officer and COR have the Director's permission and authority to stop work whenever conditions pose an imminent threat to life and health or threaten damage to equipment or buildings.

QQ. Subcontractors

- The general contractor has the responsibility to assure that all the subcontractors and their workers are properly trained and follow these safety guidelines. Assistance from VA staff will be providing on a case by case basis on technical issues.
- The VA reserves the right to approve of any subcontractor being used to complete a project.
- A worker on-site must be designated "in charge" at all times during the project.

RR. Traffic Control

- Contractors shall provide trained personnel and/or equipment, signage, barricades etc., to regulate traffic whenever construction operations affect traffic patterns.

SS. Trenching

- OSHA regulations must be followed during trenching operations.

TT. Waste Management

- Reference section 01 74 19.
- Trash, combustible waste, and excess construction materials must be removed daily to prevent accumulation. Contractors must arrange for the removal of their debris and waste. The building's dumpster shall not be used unless appropriate arrangements are made with Facilities Service.
- The contractor is encouraged to contact utilize our recycling program for the disposal of recyclables.
- The contractor is expected to comply with all environmental regulations.
- Contractor to provide a Fiscal Year breakdown of Waste Management/Recycling Costs on the project.

UU. Work Site Requirements

- Contractor to provide a list of emergency contacts at the entrance to construction site.
- All contractors are to maintain their work area as clean as possible while working and cleanup thoroughly every day.
- Prior to any utilities or critical systems being interrupted, a two weeks written notification to Facilities Management Project Engineer is mandatory. Only Facilities Management personnel will shut off a utility.

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- All contractors are expected to use courtesy. Loud, vulgar, abusive language, sexual harrassment and aggressive behavior will not be tolerated.
- All contractors working above the ceiling are required to replace all disturbed ceiling tile by the end of each day.
- Prior to making any penetrations in walls, floors or ceilings, it is the contractor's responsibility to identify rated systems and be verified through review of as builts, line diagrams, etc.
- All repaired penetrations on rated systems must be completed using a fire rated material matching the rating of the system and must inspected by the Project Engineer before ceiling tiles are replaced or area is concealed.
- Temporary construction partitions of non-combustible materials shall be installed as required to provide a smoke tight separation between the areas undergoing renovation and/or construction and adjoining areas that are occupied by the facility.
- Exits for occupied areas of the building including rooms, suites, corridors and floors shall not be blocked by the construction or by construction materials. Exit may be blocked temporarily if it is unavoidable and adequate alternative measures are provided, such as signage, instructions to occupants and approved in advance by the Project Engineer.
- Existing fire protection systems including fire alarm systems, smoke detection systems, and sprinkler systems shall not be altered except as required for the alteration and/or renovation project. Any alteration to the system shall be coordinated with Project Engineer. When sprinkler or fire and smoke detector systems are out of service for more than eight hours general contractor shall be responsible to institute a Fire Watch till systems are operational.
- At the end of each workday, combustibile packaging and crating materials for building products and equipment to be installed shall be removed from the occupied building.
- It is the responsibility of each contractor to know exactly where the fire extinguishers and pull stations are in the areas they are working.
- Fire hazard inspections shall be conducted daily by the contractor once construction starts and until the work is turned back over to the facility.
- All temporary electrical wiring and equipment used for construction shall be installed and used in accordance with pertinent provisions of NFPA 70 and National Electrical Code.

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- Contractor shall maintain construction site to permit access by the fire department as necessary. Clear building construction areas of obstructions so that all portions are accessible for fire department apparatus and permit emergency egress of patients and other personnel.
- All necessary precautions shall be taken by the contractor to prevent accidental operation of any existing smoke detectors by minimizing the amount of dust generated in the vicinity of any smoke detectors. Any activity that may generate dust or smoke shall be reviewed with the Project Engineer and the infectious control nurse.

VV. Apprentices Working on Project:

Apprentices are authorized to work on all projects disciplines providing the following requirements are met:

- Completion of OHSA-10 training and certification turned in as required for all other workers
- Apprenticeship documentation turned in to contracting and continued direct supervision by a journeyman.
- Apprentices are not allowed to work at the Edward Hines, Jr. VA Hospital on their own nor without continuous direct supervision.

**1.16 STANDARD REQUIRED FORMS**

A. The following forms are required as noted below:

- a. Contractor's Checklist - Completed and signed by General Contractor *prior to start of construction.*
- b. Contractor's Impact Statement - Completed and signed by every contractor / subcontractor working on the project *prior to start of construction.*

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**SECTION 01 32 16.15**  
**PROJECT SCHEDULES**  
**(SMALL PROJECTS - DESIGN/BID/BUILD)**

**PART 1- GENERAL**

**1.1 DESCRIPTION:**

- A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and shall keep the Project Schedule up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) technique shall be utilized to satisfy both time and cost applications.

**1.2 CONTRACTOR'S REPRESENTATIVE:**

- A. The Contractor shall designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the Contracting Officer's Representative (COR).
- B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section.
- C. The Contractor's representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant. If an outside scheduling consultant is utilized, Section 1.3 of this specification will apply.

**1.3 CONTRACTOR'S CONSULTANT:**

- A. The Contractor shall submit a qualification proposal to the COR, within 10 days of bid acceptance. The qualification proposal shall include:
1. The name and address of the proposed consultant.



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2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
  3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.
- B. The Contracting Officer has the right to approve or disapprove the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of the qualification proposal. In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor shall have their scheduling consultant approved prior to submitting any schedule for approval.

**1.4 COMPUTER PRODUCED SCHEDULES**

- A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. The COR shall identify the five different report formats that the contractor shall provide.

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**1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL**

- A. Contractor shall submit to the COR in pdf and MS Project format a complete project schedule with detail on timeline noted in the statement of work.

**1.6 WORK ACTIVITY/EVENT COST DATA**

- A. The Contractor shall cost load all work activities except procurement activities. The cumulative amount of all cost loaded work activities (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity cost data will not be acceptable, except on VA issued contract changes.
- B. The Contractor shall cost load work activities for guarantee period services, test, balance and adjust various systems in accordance with the provisions in Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS).
- C. In accordance with FAR 52.236 - 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 - 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities of the project for which the Contractor's forces will perform the work.

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- D. The Contractor shall cost load work activities for all BID ITEMS including ASBESTOS ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

**1.7 PROJECT SCHEDULE REQUIREMENTS**

- A. Show on the project schedule the sequence of work activities required for complete performance of all items of work. The Contractor Shall:

1. Show activities as:

- a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
- b. Contracting Officer's and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
- c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
- d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
- e. VA inspection and acceptance activity with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity required by the contract phasing for that phase.

2. Show not only the activities for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.

3. Break up the work into activities of a duration no longer than 20 work days each or one reporting period, except as to

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- non-construction activities (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities for which the COR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.
4. Describe work activities clearly, so the work is readily identifiable for assessment of completion. Activities labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
  5. The schedule shall be generally numbered in such a way to reflect discipline, phase or location of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
1. The appropriate project calendar including working days and holidays.
  2. The planned number of shifts per day.
  3. The number of hours per shift.
- Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.
- C. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COR. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COR's approval of the Project Schedule.
- D. Compact Disk Requirements and CPM Activity Record Specifications:  
Submit to the VA an electronic file(s) containing one file of the

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data required to produce a schedule, reflecting all the activities of the complete project schedule being submitted.

**1.8 PAYMENT TO THE CONTRACTOR:**

- A. Monthly, the contractor shall submit the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.
- B. Approval of the Contractor's monthly Application for Payment shall be contingent, among other factors, on the submittal of a satisfactory monthly update of the project schedule.

**1.9 PAYMENT AND PROGRESS REPORTING**

- A. Monthly schedule update meetings will be held on dates mutually agreed to by the COR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:
  - 1. Actual start and/or finish dates for updated/completed activities.

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2. Remaining duration for each activity started, or scheduled to start, but not completed.
  3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.
  4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
  5. Completion percentage for all completed and partially completed activities/events.
  6. Logic and duration revisions required by this section of the specifications.
  7. Activity duration and percent complete shall be updated independently.
- B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.
- C. After completing the monthly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and COR for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the COR. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and

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shall be submitted to the COR within fourteen (14) calendar days of completing the regular schedule update. Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.

- D. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, RE office representatives, and all subcontractors needed, as determined by the SRE, shall meet to discuss the monthly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule during the reporting period. The Government representatives and the Contractor should conclude the meeting with a clear understanding of those work and administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

#### **1.10 RESPONSIBILITY FOR COMPLETION**

- A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be

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met, the Contractor shall execute some or all of the following remedial actions:

1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
3. Reschedule the work in conformance with the specification requirements.

B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

#### **1.11 CHANGES TO THE SCHEDULE**

A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity changes including predecessors and successors for any of the following reasons:

1. Delay in completion of any activity or group of activities, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
3. The schedule does not represent the actual prosecution and progress of the project.



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4. When there is, or has been, a substantial revision to the activity costs regardless of the cause for these revisions.
- B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.
- C. Contracting Officer's approval for the revised project schedule and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.
- D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.
- E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

**1.12 ADJUSTMENT OF CONTRACT COMPLETION**

- A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the COR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the

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Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.

- B. Actual delays in activities which, according to the computer- produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.
- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.
- D. All delays due to non-work activities/events such as RFI's, WEATHER, STRIKES, and similar non-work activities shall be analyzed on a month by month basis.

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**SECTION 01 33 23**

**SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES**

- 1-1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- 1-2. For the purposes of this contract, samples (including laboratory samples to be tested), test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.
- 1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
  - A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
  - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
  - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- 1-4. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals (including any laboratory samples to be tested) will not serve as a basis for extending contract time for completion.
- 1-5. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by COR on behalf of the Contracting Officer.
- 1-6. Upon receipt of submittals, Architect-Engineer will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

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- 1-7. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.
- 1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect-Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
- A. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail FAX and shall contain the list of items, name of Medical Center, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
  2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Cemetery, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
  3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- B. In addition to complying with the applicable requirements specified in preceding Article 1.9, samples which are required to have Laboratory

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Tests (those preceded by symbol "LT" under the separate sections of the specification shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.

1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.
  2. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
  3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
  4. Contractor shall send a copy of transmittal letter to both COR and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
  5. Laboratory test reports shall be sent directly to COR for appropriate action.
  6. Laboratory reports shall list contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.
  7. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.
- C. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- D. Approved samples will be kept on file by the COR at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.

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- E. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
1. For each drawing required, submit one legible photographic paper or vellum reproducible.
  2. Reproducible shall be full size.
  3. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
  4. A space 4-3/4 by 5 inches shall be reserved on each drawing to accommodate approval or disapproval stamp.
  5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
  6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
  7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
- 1-10. Samples (except laboratory samples), shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to

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(Architect-Engineer)

700 Nicholas Blvd. Ste 300

(A/E P.O. Address)

Elk Grove Village, Il. 60007

- 1-11. At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the COR.
- 1-12. Samples for approval shall be sent to Architect-Engineer, in care of COR, VA Medical Center,

700 Nicholas Blvd. Ste 300

Elk Grove Village, IL.60007

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**SECTION 01 35 26**  
**SAFETY REQUIREMENTS**

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**SECTION 01 35 26**  
**SAFETY REQUIREMENTS**

**1.1 APPLICABLE PUBLICATIONS:**

A. Latest publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.

B. American Society of Safety Engineers (ASSE):

A10.1-2011.....Pre-Project & Pre-Task Safety and Health  
Planning

A10.34-2012.....Protection of the Public on or Adjacent to  
Construction Sites

A10.38-2013.....Basic Elements of an Employer's Program to  
Provide a Safe and Healthful Work Environment  
American National Standard Construction and  
Demolition Operations

C. American Society for Testing and Materials (ASTM):

E84-2013.....Surface Burning Characteristics of Building  
Materials

D. The Facilities Guidelines Institute (FGI):

FGI Guidelines-2010Guidelines for Design and Construction of  
Healthcare Facilities

E. National Fire Protection Association (NFPA):

10-2013.....Standard for Portable Fire Extinguishers

30-2012.....Flammable and Combustible Liquids Code

51B-2014.....Standard for Fire Prevention During Welding,  
Cutting and Other Hot Work

70-2014.....National Electrical Code



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70B-2013.....Recommended Practice for Electrical Equipment  
Maintenance

70E-2012 .....Standard for Electrical Safety in the Workplace

99-2012.....Health Care Facilities Code

241-2013.....Standard for Safeguarding Construction,  
Alteration, and Demolition Operations

F. The Joint Commission (TJC)

TJC Manual .....Comprehensive Accreditation and Certification  
Manual

G. U.S. Nuclear Regulatory Commission

10 CFR 20 .....Standards for Protection Against Radiation

H. U.S. Occupational Safety and Health Administration (OSHA):

29 CFR 1904 .....Reporting and Recording Injuries & Illnesses

29 CFR 1910 .....Safety and Health Regulations for General  
Industry

29 CFR 1926 .....Safety and Health Regulations for Construction  
Industry

CPL 2-0.124.....Multi-Employer Citation Policy

I. VHA Directive 2005-007

**1.2 DEFINITIONS:**

A. OSHA "Competent Person" (CP). One who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).

B. "Qualified Person" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge,

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training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

- C. High Visibility Accident. Any mishap which may generate publicity or high visibility.
- D. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.
- E. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:
  - 1. Death, regardless of the time between the injury and death, or the length of the illness;
  - 2. Days away from work (any time lost after day of injury/illness onset);
  - 3. Restricted work;
  - 4. Transfer to another job;
  - 5. Medical treatment beyond first aid;
  - 6. Loss of consciousness; or
  - 7. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

**1.3 REGULATORY REQUIREMENTS:**

- A. In addition to the detailed requirements included in the provisions of this contract, comply with 29 CFR 1926, comply with 29 CFR 1910 as incorporated by reference within 29 CFR 1926, comply with ASSE A10.34, and all applicable [federal, state, and local] laws, ordinances, criteria, rules and regulations Of VA. Submit matters of interpretation of standards for resolution before starting work. Where the

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requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern except with specific approval and acceptance by the COR.

**1.4 ACCIDENT PREVENTION PLAN (APP): NOT USED**

**1.5 ACTIVITY HAZARD ANALYSES (AHAS): NOT USED**

**1.6 PRECONSTRUCTION CONFERENCE:**

- A. Contractor representatives who have a responsibility or significant role in implementation of the accident prevention program, as required by 29 CFR 1926.20(b)(1), on the project shall attend the preconstruction conference to gain a mutual understanding of its implementation. This includes the project superintendent, subcontractor superintendents, and any other assigned safety and health professionals.
- B. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.
- C. Deficiencies in the submitted APP will be brought to the attention of the Contractor within 14 days of submittal, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

**1.7 "SITE SAFETY AND HEALTH OFFICER" (SSHO) AND "COMPETENT PERSON" (CP):**

- A. The Prime Contractor shall designate a minimum of one SSHO at each project site that will be identified as the SSHO to administer the Contractor's safety program and government-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b)(2) that will be identified as a CP to administer their individual safety programs.

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- B. Further, all specialized Competent Persons for the work crews will be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
- C. These Competent Persons can have collateral duties as the subcontractor's superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
- D. The SSHO or an equally-qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with FAR Clause 52.236-6: *Superintendence by the Contractor*. CPs will maintain presence during their construction activities in accordance with above mentioned clause. A listing of the designated SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.
- E. The repeated presence of uncontrolled hazards during a contractor's work operations will result in the designated CP as being deemed incompetent and result in the required removal of the employee in accordance with FAR Clause 52.236-5: Material and Workmanship, Paragraph (c).

**1.8 TRAINING:**

- A. The designated Prime Contractor SSHO must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety

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and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.

- B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course within the past 5 years.
- C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.
- D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.
- E. Submit training records associated with the above training requirements to the Project Manager and Facility Safety Manager or Contracting Officer Representative for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance.
- F. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, emergency procedures, accident reporting etc... Documentation shall be provided to the COR that individuals have undergone contractor's safety briefing.
- G. Ongoing safety training will be accomplished in the form of weekly documented safety meeting.

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**1.9 INSPECTIONS:**

- A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of the their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to Project Manager and Facility Safety Manager or Contracting Officer Representative .
- B. A Certified Safety Professional (CSP) with specialized knowledge in construction safety or a certified Construction Safety and Health Technician (CSHT) shall randomly conduct a monthly site safety inspection. The CSP or CSHT can be a corporate safety professional or independently contracted. The CSP or CSHT will provide their certificate number on the required report for verification as necessary.
  - 1. Results of the inspection will be documented with tracking of the identified hazards to abatement.
  - 2. The Project Manager and Facility Safety Manager or Contracting Officer Representative will be notified immediately prior to start of the inspection and invited to accompany the inspection.
  - 3. Identified hazard and controls will be discussed to come to a mutual understanding to ensure abatement and prevent future reoccurrence.
  - 4. A report of the inspection findings with status of abatement will be provided to the Project Manager and Facility Safety Manager or Contracting Officer Representative within one week of the onsite inspection.

**1.10 ACCIDENTS, OSHA 300 LOGS, AND MAN-HOURS:**

- A. Notify the Project Manager and Facility Safety Manager or Contracting Officer Representative as soon as practical, but no more than four hours after any accident meeting the definition of OSHA Recordable

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Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than \$5,000, or any weight handling equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Project Manager and Facility Safety Manager or determine whether a government investigation will be conducted.

- B. Conduct an accident investigation for recordable injuries and illnesses, for Medical Treatment defined in paragraph DEFINITIONS, and property damage accidents resulting in at least \$20,000 in damages, to establish the root cause(s) of the accident. Complete the VA Form 2162, and provide the report to the Project Manager and Facility Safety Manager or Contracting Officer Representative within 5 calendar days of the accident. The Project Manager and Facility Safety Manager will provide copies of any required or special forms.
- C. A summation of all man-hours worked by the contractor and associated sub-contractors for each month will be reported to the Project Manager and Facility Safety Manager monthly.
- D. A summation of all OSHA recordable accidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the Project Manager and Facility Safety Manager Officer monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the Project Manager and Facility Safety Manager as requested.

**1.11 PERSONAL PROTECTIVE EQUIPMENT (PPE):**

- A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.

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B. Mandatory PPE includes:

1. Hard Hats - unless written authorization is given by the Facility Safety Manager in circumstances of work operations that have limited potential for falling object hazards such as during finishing work or minor remodeling. With authorization to relax the requirement of hard hats, if a worker becomes exposed to an overhead falling object hazard, then hard hats would be required in accordance with the OSHA regulations.
2. Safety glasses - unless written authorization is given by the and Facility Safety appropriate safety glasses meeting the ANSI Z.87.1 standard must be worn by each person on site.
3. Appropriate Safety Shoes - based on the hazards present, safety shoes meeting the requirements of ASTM F2413-11 shall be worn by each person on site unless written authorization is given by the Facility Safety Manager ...
4. Hearing protection - Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks.

**1.12 INFECTION CONTROL**

- A. Infection Control is critical in all medical center facilities. Interior construction activities causing disturbance of existing dust, or creating new dust, must be conducted within ventilation-controlled areas that minimize the flow of airborne particles into patient areas. Exterior construction activities causing disturbance of soil or creates dust in some other manner must be controlled.
- B. An AHA associated with infection control will be performed by VA personnel in accordance with FGI Guidelines (i.e. Infection Control Risk Assessment (ICRA)). The ICRA procedure found on the American Society for Healthcare Engineering (ASHE) website will be utilized. Risk classifications of Class II or lower will require approval by the Project Manager and Facility Safety Manager before beginning any construction work. Risk classifications of Class III or higher will



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require a permit before beginning any construction work. Infection Control permits will be issued by the Project Engineer. The Infection Control Permits will be posted outside the appropriate construction area. More than one permit may be issued for a construction project if the work is located in separate areas requiring separate classes. The primary project scope area for this project is: Class [\_\_\_\_], however, work outside the primary project scope area may vary. The required infection control precautions with each class are as follows:

1. Class I requirements:

a. During construction work:

- 1) Notify the constructing officer Representative.
- 2) Execute work by methods to minimize raising dust from construction operations.
- 3) Ceiling tiles: Immediately replace a ceiling tiles displaced for visual inspection.

b. Upon Completion:

- 1) Clean work area upon completion of task
- 2) Notify the COR.

**1.13 TUBERCULOSIS SCREENING- (NOT USED)**

**1.14 FIRE SAFETY-**

- A. Fire Safety Plan: Establish and maintain a site-specific fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. This plan may be an element of the Accident Prevention Plan.

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- B. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- C. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- D. Temporary Construction Partitions:
  - 1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of fire retardant treated wood or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, ¾ hour fire/smoke rated doors with self-closing devices.
  - 2. Install one-hour temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.
  - 3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration firestop materials in accordance with Section 07 84 00, FIRESTOPPING.
- E. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- F. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with COR.

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- G. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to COR.
- H. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- I. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- J. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers.
- K. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with COR. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.
- L. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with COR.
- M. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to COR.
- N. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- O. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.

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- P. If required, submit documentation to the COR that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

**1.15 ELECTRICAL**

- A. All electrical work shall comply with NFPA 70 (NEC), NFPA 70B, NFPA 70E, 29 CFR Part 1910 Subpart J - General Environmental Controls, 29 CFR Part 1910 Subpart S - Electrical, and 29 CFR 1926 Subpart K in addition to other references required by contract.
- B. All qualified persons performing electrical work under this contract shall be licensed journeyman or master electricians. All apprentice electricians performing under this contract shall be deemed unqualified persons unless they are working under the immediate supervision of a licensed electrician or master electrician.
- C. All electrical work will be accomplished de-energized and in the Electrically Safe Work Condition (refer to NFPA 70E for Work Involving Electrical Hazards, including Exemptions to Work Permit). Any Contractor, subcontractor or temporary worker who fails to fully comply with this requirement is subject to immediate termination in accordance with FAR clause 52.236-5(c). Only in rare circumstance where achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards, or is infeasible due to equipment design or operational limitations is energized work permitted. The Project Manager and Facility Safety Manager with approval of the Medical Center Director will make the determination if the circumstances would meet the exception outlined above. An AHA specific to energized work activities will be developed, reviewed, and accepted prior to the start of that work.
1. Development of a Hazardous Electrical Energy Control Procedure is required prior to de-energization. A single Simple Lockout/Tagout Procedure for multiple work operations can only be used for work involving qualified person(s) de-energizing one set of conductors or circuit part source. Task specific Complex Lockout/Tagout Procedures are required at all other times.

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2. Verification of the absence of voltage after de-energization and lockout/tagout is considered "energized electrical work" (live work) under NFPA 70E, and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rate personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they will be used.
3. Personal Protective Equipment (PPE) and electrical testing instruments will be readily available for inspection by the COR.

Before beginning any electrical work, an Activity Hazard Analysis (AHA) will be conducted to include Shock Hazard and Arc Flash Hazard analyses (NFPA Tables can be used only as a last alternative and it is strongly suggested a full Arc Flash Hazard Analyses be conducted). Work shall not begin until the AHA for the work activity has been accepted by the COR and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.

Ground-fault circuit interrupters. All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites shall have approved ground-fault circuit interrupters for personnel protection. "Assured Equipment Grounding Conductor Program" only is not allowed.

#### **1.16 FALL PROTECTION**

- A. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) for ALL WORK, unless specified differently or the OSHA 29 CFR 1926 requirements are more stringent, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work.

1. The use of a Safety Monitoring System (SMS) as a fall protection method is prohibited.
2. The use of Controlled Access Zone (CAZ) as a fall protection method is prohibited.

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3. A Warning Line System (WLS) may ONLY be used on floors or flat or low-sloped roofs (between 0 - 18.4 degrees or 4:12 slope) and shall be erected around all sides of the work area (See 29 CFR 1926.502(f) for construction of WLS requirements). Working within the WLS does not require FP. No worker shall be allowed in the area between the roof or floor edge and the WLS without FP. FP is required when working outside the WLS.
4. Fall protection while using a ladder will be governed by the OSHA requirements.

**1.17 SCAFFOLDS AND OTHER WORK PLATFORMS-(NOT USED)**

**1.18 EXCAVATION AND TRENCHES- (NOT USED)**

**1.19 CRANES**

- A. All crane work shall comply with 29 CFR 1926 Subpart CC.
- B. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no "Phase In" date of November 10, 2014.
- C. A detailed lift permit shall be submitted 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing. The lift will not be allowed without approval of this document.
- D. Crane operators shall not carry loads
  1. over the general public or VAMC personnel
  2. over any occupied building unless
    - a. the top two floors are vacated
    - b. or overhead protection with a design live load of 300 psf is provided

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**1.20 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)-(NOT USED)**

**1.21 CONFINED SPACE ENTRY- NOT USED**

**1.22 WELDING AND CUTTING**

As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Project Manager and/or Facility Safety Manager . Obtain permits from Project Manager and/or Facility Safety Manager at least \_5\_ hours in advance.

**1.23 LADDERS**

- A. All Ladder use shall comply with 29 CFR 1926 Subpart X.
- B. All portable ladders shall be of sufficient length and shall be placed so that workers will not stretch or assume a hazardous position.
- C. Manufacturer safety labels shall be in place on ladders
- D. Step Ladders shall not be used in the closed position
- E. Top steps or cap of step ladders shall not be used as a step
- A. Portable ladders, used as temporary access, shall extend at least 3 ft (0.9 m) above the upper landing surface.
  - 1. When a 3 ft (0.9-m) extension is not possible, a grasping device (such as a grab rail) shall be provided to assist workers in mounting and dismounting the ladder.
  - 2. In no case shall the length of the ladder be such that ladder deflection under a load would, by itself, cause the ladder to slip from its support.
- G. Ladders shall be inspected for visible defects on a daily basis and after any occurrence that could affect their safe use. Broken or damaged ladders shall be immediately tagged "DO NOT USE," or with similar wording, and withdrawn from service until restored to a condition meeting their original design.

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**1.24 FLOOR & WALL OPENINGS-**

- A. All floor and wall openings shall comply with 29 CFR 1926 Subpart M.
- B. Floor and roof holes/openings are any that measure over 2 in (51 mm) in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. See 21.F for covering and labeling requirements. Skylights located in floors or roofs are considered floor or roof hole/openings.
- C. All floor, roof openings or hole into which a person can accidentally walk or fall through shall be guarded either by a railing system with toeboards along all exposed sides or a load-bearing cover. When the cover is not in place, the opening or hole shall be protected by a removable guardrail system or shall be attended when the guarding system has been removed, or other fall protection system.
  - 1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.
  - 2. Covers shall be secured when installed, clearly marked with the word "HOLE", "COVER" or "Danger, Roof Opening-Do Not Remove" or color-coded or equivalent methods (e.g., red or orange "X"). Workers must be made aware of the meaning for color coding and equivalent methods.
  - 3. Roofing material, such as roofing membrane, insulation or felts, covering or partly covering openings or holes, shall be immediately cut out. No hole or opening shall be left unattended unless covered.
  - 4. Non-load-bearing skylights shall be guarded by a load-bearing skylight screen, cover, or railing system along all exposed sides.
  - 5. Workers are prohibited from standing/walking on skylights.

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**SECTION 01 42 19**  
**REFERENCE STANDARDS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

**1.2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)**

- A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to - GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.
- B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

**1.3 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-4) (JUN 1988)**

- A. The specifications and standards cited in this solicitation can be examined at the following location:

DEPARTMENT OF VETERANS AFFAIRS  
Office of Construction & Facilities Management  
Facilities Quality Service (00CFM1A)  
425 Eye Street N.W, (sixth floor)  
Washington, DC 20001

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Telephone Numbers: (202) 632-5249 or (202) 632-5178  
Between 9:00 AM - 3:00 PM

**1.4 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)**

The specifications cited in this solicitation may be obtained from the associations or organizations listed below.

AA	Aluminum Association Inc. <a href="http://www.aluminum.org">http://www.aluminum.org</a>
AABC	Associated Air Balance Council <a href="http://www.aabchq.com">http://www.aabchq.com</a>
AAMA	American Architectural Manufacturer's Association <a href="http://www.aamanet.org">http://www.aamanet.org</a>
AAN	American Nursery and Landscape Association <a href="http://www.anla.org">http://www.anla.org</a>
AASHTO	American Association of State Highway and Transportation Officials <a href="http://www.aashto.org">http://www.aashto.org</a>
AATCC	American Association of Textile Chemists and Colorists <a href="http://www.aatcc.org">http://www.aatcc.org</a>
ACGIH	American Conference of Governmental Industrial Hygienists <a href="http://www.acgih.org">http://www.acgih.org</a>
ACI	American Concrete Institute <a href="http://www.aci-int.net">http://www.aci-int.net</a>
ACPA	American Concrete Pipe Association <a href="http://www.concrete-pipe.org">http://www.concrete-pipe.org</a>
ACPPA	American Concrete Pressure Pipe Association <a href="http://www.acppa.org">http://www.acppa.org</a>

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ADC	Air Diffusion Council <a href="http://flexibleduct.org">http://flexibleduct.org</a>
AGA	American Gas Association <a href="http://www.aga.org">http://www.aga.org</a>
AGC	Associated General Contractors of America <a href="http://www.agc.org">http://www.agc.org</a>
AGMA	American Gear Manufacturers Association, Inc. <a href="http://www.agma.org">http://www.agma.org</a>
AHAM	Association of Home Appliance Manufacturers <a href="http://www.aham.org">http://www.aham.org</a>
AIA	American Institute of Architects <a href="http://www.aia.org">http://www.aia.org</a>
AISC	American Institute of Steel Construction <a href="http://www.aisc.org">http://www.aisc.org</a>
AISI	American Iron and Steel Institute <a href="http://www.steel.org">http://www.steel.org</a>
AITC	American Institute of Timber Construction <a href="http://www.aitc-glulam.org">http://www.aitc-glulam.org</a>
AMCA	Air Movement and Control Association, Inc. <a href="http://www.amca.org">http://www.amca.org</a>
ANLA	American Nursery & Landscape Association <a href="http://www.anla.org">http://www.anla.org</a>
ANSI	American National Standards Institute, Inc. <a href="http://www.ansi.org">http://www.ansi.org</a>
APA	The Engineered Wood Association <a href="http://www.apawood.org">http://www.apawood.org</a>

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ARI Air-Conditioning and Refrigeration Institute  
<http://www.ari.org>

ASAE American Society of Agricultural Engineers  
<http://www.asae.org>

ASCE American Society of Civil Engineers  
<http://www.asce.org>

ASHRAE American Society of Heating, Refrigerating, and  
Air-Conditioning Engineers  
<http://www.ashrae.org>

ASME American Society of Mechanical Engineers  
<http://www.asme.org>

ASSE American Society of Sanitary Engineering  
<http://www.asse-plumbing.org>

ASTM American Society for Testing and Materials  
<http://www.astm.org>

AWI Architectural Woodwork Institute  
<http://www.awinet.org>

AWS American Welding Society  
<http://www.aws.org>

AWWA American Water Works Association  
<http://www.awwa.org>

BHMA Builders Hardware Manufacturers Association  
<http://www.buildershardware.com>

BIA Brick Institute of America  
<http://www.bia.org>

CAGI Compressed Air and Gas Institute  
<http://www.cagi.org>

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CGA	Compressed Gas Association, Inc. <a href="http://www.cganet.com">http://www.cganet.com</a>
CI	The Chlorine Institute, Inc. <a href="http://www.chlorineinstitute.org">http://www.chlorineinstitute.org</a>
CISCA	Ceilings and Interior Systems Construction Association <a href="http://www.cisca.org">http://www.cisca.org</a>
CISPI	Cast Iron Soil Pipe Institute <a href="http://www.cispi.org">http://www.cispi.org</a>
CLFMI	Chain Link Fence Manufacturers Institute <a href="http://www.chainlinkinfo.org">http://www.chainlinkinfo.org</a>
CPMB	Concrete Plant Manufacturers Bureau <a href="http://www.cpmc.org">http://www.cpmc.org</a>
CRA	California Redwood Association <a href="http://www.calredwood.org">http://www.calredwood.org</a>
CRSI	Concrete Reinforcing Steel Institute <a href="http://www.crsi.org">http://www.crsi.org</a>
CTI	Cooling Technology Institute <a href="http://www.cti.org">http://www.cti.org</a>
DHI	Door and Hardware Institute <a href="http://www.dhi.org">http://www.dhi.org</a>
EGSA	Electrical Generating Systems Association <a href="http://www.egsa.org">http://www.egsa.org</a>
EEI	Edison Electric Institute <a href="http://www.eei.org">http://www.eei.org</a>
EPA	Environmental Protection Agency <a href="http://www.epa.gov">http://www.epa.gov</a>
ETL	ETL Testing Laboratories, Inc. <a href="http://www.etl.com">http://www.etl.com</a>

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FAA	Federal Aviation Administration <a href="http://www.faa.gov">http://www.faa.gov</a>
FCC	Federal Communications Commission <a href="http://www.fcc.gov">http://www.fcc.gov</a>
FPS	The Forest Products Society <a href="http://www.forestprod.org">http://www.forestprod.org</a>
GANA	Glass Association of North America <a href="http://www.cssinfo.com/info/gana.html/">http://www.cssinfo.com/info/gana.html/</a>
FM	Factory Mutual Insurance <a href="http://www.fmglobal.com">http://www.fmglobal.com</a>
GA	Gypsum Association <a href="http://www.gypsum.org">http://www.gypsum.org</a>
GSA	General Services Administration <a href="http://www.gsa.gov">http://www.gsa.gov</a>
HI	Hydraulic Institute <a href="http://www.pumps.org">http://www.pumps.org</a>
HPVA	Hardwood Plywood & Veneer Association <a href="http://www.hpva.org">http://www.hpva.org</a>
ICBO	International Conference of Building Officials <a href="http://www.icbo.org">http://www.icbo.org</a>
ICEA	Insulated Cable Engineers Association Inc. <a href="http://www.icea.net">http://www.icea.net</a>
\ICAC	Institute of Clean Air Companies <a href="http://www.icac.com">http://www.icac.com</a>
IEEE	Institute of Electrical and Electronics Engineers <a href="http://www.ieee.org/">http://www.ieee.org/</a>
IMSA	International Municipal Signal Association <a href="http://www.imsasafety.org">http://www.imsasafety.org</a>

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IPCEA	Insulated Power Cable Engineers Association
NBMA	Metal Buildings Manufacturers Association <a href="http://www.mbma.com">http://www.mbma.com</a>
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry Inc. <a href="http://www.mss-hq.com">http://www.mss-hq.com</a>
NAAMM	National Association of Architectural Metal Manufacturers <a href="http://www.naamm.org">http://www.naamm.org</a>
NAPHCC	Plumbing-Heating-Cooling Contractors Association <a href="http://www.phccweb.org.org">http://www.phccweb.org.org</a>
NBS	National Bureau of Standards See - NIST
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors <a href="http://www.nationboard.org">http://www.nationboard.org</a>
NEC	National Electric Code See - NFPA National Fire Protection Association
NEMA	National Electrical Manufacturers Association <a href="http://www.nema.org">http://www.nema.org</a>
NFPA	National Fire Protection Association <a href="http://www.nfpa.org">http://www.nfpa.org</a>
NHLA	National Hardwood Lumber Association <a href="http://www.natlhardwood.org">http://www.natlhardwood.org</a>
NIH	National Institute of Health <a href="http://www.nih.gov">http://www.nih.gov</a>
NIST	National Institute of Standards and Technology <a href="http://www.nist.gov">http://www.nist.gov</a>
NLMA	Northeastern Lumber Manufacturers Association, Inc. <a href="http://www.nelma.org">http://www.nelma.org</a>

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NPA National Particleboard Association  
18928 Premiere Court  
Gaithersburg, MD 20879  
(301) 670-0604

NSF National Sanitation Foundation  
<http://www.nsf.org>

NWDA Window and Door Manufacturers Association  
<http://www.nwda.org>

OSHA Occupational Safety and Health Administration  
Department of Labor  
<http://www.osha.gov>

PCA Portland Cement Association  
<http://www.portcement.org>

PCI Precast Prestressed Concrete Institute  
<http://www.pci.org>

PPI The Plastic Pipe Institute  
<http://www.plasticpipe.org>

PEI Porcelain Enamel Institute, Inc.  
<http://www.porcelainenamel.com>

PTI Post-Tensioning Institute  
<http://www.post-tensioning.org>

RFCI The Resilient Floor Covering Institute  
<http://www.rfci.com>

RIS Redwood Inspection Service  
See - CRA

RMA Rubber Manufacturers Association, Inc.  
<http://www.rma.org>



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SCMA	Southern Cypress Manufacturers Association <a href="http://www.cypressinfo.org">http://www.cypressinfo.org</a>
SDI	Steel Door Institute <a href="http://www.steeldoor.org">http://www.steeldoor.org</a>
IGMA	Insulating Glass Manufacturers Alliance <a href="http://www.igmaonline.org">http://www.igmaonline.org</a>
SJI	Steel Joist Institute <a href="http://www.steeljoist.org">http://www.steeljoist.org</a>
SMACNA	Sheet Metal and Air-Conditioning Contractors National Association, Inc. <a href="http://www.smacna.org">http://www.smacna.org</a>
SSPC	The Society for Protective Coatings <a href="http://www.sspc.org">http://www.sspc.org</a>
STI	Steel Tank Institute <a href="http://www.steeltank.com">http://www.steeltank.com</a>
SWI	Steel Window Institute <a href="http://www.steelwindows.com">http://www.steelwindows.com</a>
TCA	Tile Council of America, Inc. <a href="http://www.tileusa.com">http://www.tileusa.com</a>
TEMA	Tubular Exchange Manufacturers Association <a href="http://www.tema.org">http://www.tema.org</a>
TPI	Truss Plate Institute, Inc. 583 D'Onofrio Drive; Suite 200 Madison, WI 53719 (608) 833-5900
UBC	The Uniform Building Code See ICBO

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UL Underwriters' Laboratories Incorporated  
<http://www.ul.com>

ULC Underwriters' Laboratories of Canada  
<http://www.ulc.ca>

WCLIB West Coast Lumber Inspection Bureau  
6980 SW Varns Road, P.O. Box 23145  
Portland, OR 97223  
(503) 639-0651

WRCLA Western Red Cedar Lumber Association  
P.O. Box 120786  
New Brighton, MN 55112  
(612) 633-4334

WWPA Western Wood Products Association  
<http://www.wwpa.org>

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**SECTION 01 57 19**

**TEMPORARY ENVIRONMENTAL CONTROLS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.
- B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
  - 1. Adversely effect human health or welfare,
  - 2. Unfavorably alter ecological balances of importance to human life,
  - 3. Effect other species of importance to humankind, or;
  - 4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.
- C. Definitions of Pollutants:
  - 1. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
  - 2. Sediment: Soil and other debris that has been eroded and transported by runoff water.
  - 4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
  - 5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.
  - 6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.

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7. Sanitary Wastes:

- a. Sewage: Domestic sanitary sewage and human and animal waste.
- b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

**1.2 QUALITY CONTROL**

- A. Establish and maintain quality control for the environmental protection of all items set forth herein.
- B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

**1.3 REFERENCES**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. U.S. National Archives and Records Administration (NARA):  
33 CFR 328.....Definitions

**1.4 SUBMITTALS**

- A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
  - 1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the COR to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, the Contractor shall prepare and submit to the COR for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
    - a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
    - b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
    - c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
    - d. Description of the Contractor's environmental protection personnel training program.
    - e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's

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proposed operations and the requirements imposed by those laws, regulations, and permits.

- f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
  - g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.
  - h. Permits, licenses, and the location of the solid waste disposal area.
    - i. Environmental Monitoring Plans for the job site including land, water, air, and noise.
  - k. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
- B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

**1.5 PROTECTION OF ENVIRONMENTAL RESOURCES**

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the COR. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.
  - 1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before

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- construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
    - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
    - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
    - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
  3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
  4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.
- C. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of Illinois of State and title of State Air Pollution Statue, Rule, or Regulation and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.
1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
- D. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as

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directed by the COR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.

1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00p.m unless otherwise permitted by local ordinance or the COR. Repetitive impact noise on the property shall not exceed the following dB limitations:

Time Duration of Impact Noise	Sound Level in dB
More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75

2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:

- a. Maintain maximum permissible construction equipment noise levels at 15 m (50 feet) (dBA):

EARTHMOVING		MATERIALS HANDLING	
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	DERRICKS IMPACT	75
SCAPERS	80	PILE DRIVERS	95
GRADERS	75	JACK HAMMERS	75
TRUCKS	75	ROCK DRILLS	80
PAVERS, STATIONARY	80	PNEUMATIC TOOLS	80
PUMPS	75	BLASTING	
GENERATORS	75	SAWS	75
COMPRESSORS	75	VIBRATORS	75

- b. Use shields or other physical barriers to restrict noise transmission.
- c. Provide soundproof housings or enclosures for noise-producing machinery.
- d. Use efficient silencers on equipment air intakes.

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- e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
  - f. Line hoppers and storage bins with sound deadening material.
  - g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face. Submit the recorded information to the COR noting any problems and the alternatives for mitigating actions.
- E. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
- F. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the COR. Cleaning shall include off the station disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

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**SECTION 01 74 19**

**CONSTRUCTION WASTE MANAGEMENT**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.
- C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
  - 1. Waste Management Plan development and implementation.
  - 2. Techniques to minimize waste generation.
  - 3. Sorting and separating of waste materials.
  - 4. Salvage of existing materials and items for reuse or resale.
  - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
  - 1. Soil.
  - 2. Inerts (eg, concrete, masonry and asphalt).
  - 3. Clean dimensional wood and palette wood.
  - 4. Green waste (biodegradable landscaping materials).
  - 5. Engineered wood products (plywood, particle board and I-joists, etc).
  - 6. Metal products (eg, steel, wire, beverage containers, copper, etc).
  - 7. Cardboard, paper and packaging.
  - 8. Bitumen roofing materials.
  - 9. Plastics (eg, ABS, PVC).
  - 10. Carpet and/or pad.
  - 11. Gypsum board.
  - 12. Insulation.
  - 13. Paint.
  - 14. Fluorescent lamps.

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**1.2 RELATED WORK**

- A. Section 02 41 00, DEMOLITION.
- B. Section 01 00 00, GENERAL REQUIREMENTS.
- C. Lead Paint: Section 02 83 33.13, LEAD BASED PAINT REMOVAL AND DISPOSAL.

**1.3 QUALITY ASSURANCE**

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction Demolition waste includes products of the following:
  - 1. Excess or unusable construction materials.
  - 2. Packaging used for construction products.
  - 3. Poor planning and/or layout.
  - 4. Construction error.
  - 5. Over ordering.
  - 6. Weather damage.
  - 7. Contamination.
  - 8. Mishandling.
  - 9. Breakage.
- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.
- C. Contractor shall develop and implement procedures to recycle construction and demolition waste to a minimum of 50 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org/tools/cwm.php> provides a Construction Waste Management Database that contains

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information on companies that haul, collect, and process recyclable debris from construction projects.

- F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.
- G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.
- H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

**1.4 TERMINOLOGY**

- A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.
- B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.
- C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.
- D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.
- E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).
- F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.
- G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.
- H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.

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- I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
- J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.
- K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.
- L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
  - 1. On-site Recycling - Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
  - 2. Off-site Recycling - Materials hauled to a location and used in an altered form in the manufacture of new products.
- M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.
- N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.
- O. Return: To give back reusable items or unused products to vendors for credit.
- P. Salvage: To remove waste materials from the site for resale or re-use by a third party.
- Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.
- R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.

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- S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

**1.5 SUBMITTALS**

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:
- B. Prepare and submit to the COR a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
1. Procedures to be used for debris management.
  2. Techniques to be used to minimize waste generation.
  3. Analysis of the estimated job site waste to be generated:
    - a. List of each material and quantity to be salvaged, reused, recycled.
    - b. List of each material and quantity proposed to be taken to a landfill.
  4. Detailed description of the Means/Methods to be used for material handling.
    - a. On site: Material separation, storage, protection where applicable.
    - b. Off site: Transportation means and destination. Include list of materials.
      - 1) Description of materials to be site-separated and self-hauled to designated facilities.
      - 2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
    - c. The names and locations of mixed debris reuse and recycling facilities or sites.
    - d. The names and locations of trash disposal landfill facilities or sites.
    - e. Documentation that the facilities or sites are approved to receive the materials.

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- C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.
- D. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

**1.6 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.
- B. U.S. Green Building Council (USGBC):  
LEED Green Building Rating System for New Construction

**1.7 RECORDS**

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the LEED Reference Guide and LEED Template.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. List of each material and quantity to be salvaged, recycled, reused.
- B. List of each material and quantity proposed to be taken to a landfill.
- C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

**PART 3 - EXECUTION**

**3.1 COLLECTION**

- A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.
- B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.

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- C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

**3.2 DISPOSAL**

- A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.
- B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

**3.3 REPORT**

- A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.
- B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.
- C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

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**SECTION 01 91 00**

**GENERAL COMMISSIONING REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 COMMISSIONING DESCRIPTION**

- A. This Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS shall form the basis of the construction phase commissioning process and procedures. The Commissioning Agent shall add, modify, and refine the commissioning procedures, as approved by the Department of Veterans Affairs (VA), to suit field conditions and actual manufacturer's equipment, incorporate test data and procedure results, and provide detailed scheduling for all commissioning tasks.
- B. Various sections of the project specifications require equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in Division 26, series section of these specifications are intended to be provided in coordination with the commissioning services and are not intended to duplicate services. The Contractor shall coordinate the work required by individual specification sections with the commissioning services requirements specified herein.
- C. Where individual testing, adjusting, or related services are required in the project specifications and not specifically required by this commissioning requirements specification, the specified services shall be provided and copies of documentation, as required by those specifications shall be submitted to the VA and the Commissioning Agent to be indexed for future reference.
- D. Where training or educational services for VA are required and specified in other sections of the specifications, including but not limited to Division 26, series section of the specification, these services are intended to be provided in addition to the training and educational services specified herein.
- E. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the VA's operational needs. The commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, performance testing and training.



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Commissioning during the construction and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:

1. Verify that the applicable equipment and systems are installed in accordance with the contract documents and according to the manufacturer's recommendations.
2. Verify and document proper integrated performance of equipment and systems.
3. Verify that Operations & Maintenance documentation is complete.
4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
5. Verify that the VA's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
6. Document the successful achievement of the commissioning objectives listed above.

F. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.

**1.2 CONTRACTUAL RELATIONSHIPS**

- A. For this construction project, the Department of Veterans Affairs contracts with a Contractor to provide construction services. The contracts are administered by the VA Contracting Officer and the COR as the designated representative of the Contracting Officer. On this project, the authority to modify the contract in any way is strictly limited to the authority of the Contracting Officer.
- B. In this project, only two contract parties are recognized and communications on contractual issues are strictly limited to VA COR and the Contractor. It is the practice of the VA to require that communications between other parties to the contracts (Subcontractors and Vendors) be conducted through the COR and Contractor. It is also the practice of the VA that communications between other parties of the project (Commissioning Agent and Architect/Engineer) be conducted through the COR.

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C. With these fundamental practices in mind, the commissioning process described herein has been developed to recognize that, in the execution of the Commissioning Process, the Commissioning Agent must develop effective methods to communicate with every member of the construction team involved in delivering commissioned systems while simultaneously respecting the exclusive contract authority of the Contracting Officer and COR. Thus, the procedures outlined in this specification must be executed within the following limitations:

1. No communications (verbal or written) from the Commissioning Agent shall be deemed to constitute direction that modifies the terms of any contract between the Department of Veterans Affairs and the Contractor.
2. Commissioning Issues identified by the Commissioning Agent will be delivered to the COR and copied to the designated Commissioning Representatives for the Contractor and subcontractors on the Commissioning Team for information only in order to expedite the communication process. These issues must be understood as the professional opinion of the Commissioning Agent and as suggestions for resolution.
3. In the event that any Commissioning Issues and suggested resolutions are deemed by the COR to require either an official interpretation of the construction documents or require a modification of the contract documents, the Contracting Officer or COR will issue an official directive to this effect.
4. All parties to the Commissioning Process shall be individually responsible for alerting the COR of any issues that they deem to constitute a potential contract change prior to acting on these issues.
5. Authority for resolution or modification of design and construction issues rests solely with the Contracting Officer or COR, with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

**1.3 RELATED WORK**

- A. Section 01 00 00 GENERAL REQUIREMENTS.
- B. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- C. Section 26 08 00 COMMISSIONING OF ELECTRICAL SYSTEMS.

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**1.4 SUMMARY**

- A. This Section includes general requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.
- B. The commissioning activities have been developed to support the VA requirements to meet guidelines for Federal Leadership in Environmental, Energy, and Economic Performance.

**1.5 ACRONYMS**

List of Acronyms	
Acronym	Meaning
A/E	Architect / Engineer Design Team
AHJ	Authority Having Jurisdiction
ASHRAE	Association Society for Heating Air Condition and Refrigeration Engineers
BOD	Basis of Design
BSC	Building Systems Commissioning
CCTV	Closed Circuit Television
CD	Construction Documents
CMMS	Computerized Maintenance Management System
CO	Contracting Officer (VA)
COR	Contracting Officer's Representative (see also VA-RE)
COBie	Construction Operations Building Information Exchange
CPC	Construction Phase Commissioning
Cx	Commissioning
CxA	Commissioning Agent
CxM	Commissioning Manager
CxR	Commissioning Representative
DPC	Design Phase Commissioning
FPT	Functional Performance Test
GBI-GG	Green Building Initiative - Green Globes
LEED	Leadership in Energy and Environmental Design
NC	Department of Veterans Affairs National Cemetery
NCA	Department of Veterans Affairs National Cemetery Administration

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List of Acronyms	
Acronym	Meaning
O&M	Operations & Maintenance
OPR	Owner's Project Requirements
PFC	Pre-Functional Checklist
PFT	Pre-Functional Test
SD	Schematic Design
SO	Site Observation
VA	Department of Veterans Affairs
VAMC	VA Medical Center
VA CFM	VA Office of Construction and Facilities Management
VACO	VA Central Office
VA PM	VA Project Manager
USGBC	United States Green Building Council

## 1.6 DEFINITIONS

**Acceptance Phase Commissioning:** Commissioning tasks executed after most construction has been completed, most Site Observations and Static Tests have been completed and Pre-Functional Testing has been completed and accepted. The main commissioning activities performed during this phase are verification that the installed systems are functional by conducting Systems Functional Performance tests and Owner Training.

**Accuracy:** The capability of an instrument to indicate the true value of a measured quantity.

**Back Check:** A back check is a verification that an agreed upon solution to a design comment has been adequately addressed in a subsequent design review

**Basis of Design (BOD):** The Engineer's Basis of Design is comprised of two components: the Design Criteria and the Design Narrative, these documents record the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements (OPR) and to satisfy applicable regulatory requirements, standards, and guidelines.

**Benchmarks:** Benchmarks are the comparison of a building's energy usage to other similar buildings and to the building itself.. For example,

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ENERGY STAR Portfolio Manager is a frequently used and nationally recognized building energy benchmarking tool.

**Building Information Modeling (BIM):** Building Information Modeling is a parametric database which allows a building to be designed and constructed virtually in 3D, and provides reports both in 2D views and as schedules. This electronic information can be extracted and reused for pre-populating facility management CMMS systems. Building Systems Commissioning (BSC): NEBB acronym used to designate its commissioning program.

**Calibrate:** The act of comparing an instrument of unknown accuracy with a standard of known accuracy to detect, correlate, report, or eliminate by adjustment any variation in the accuracy of the tested instrument.

**CCTV:** Closed circuit Television. Normally used for security surveillance and alarm detections as part of a special electrical security system.

**COBie:** Construction Operations Building Information Exchange (COBie) is an electronic industry data format used to transfer information developed during design, construction, and commissioning into the Computer Maintenance Management Systems (CMMS) used to operate facilities. See the Whole Building Design Guide website for further information (<http://www.wbdg.org/resources/cobie.php>)

**Commissionability:** Defines a design component or construction process that has the necessary elements that will allow a system or component to be effectively measured, tested, operated and commissioned

**Commissioning Agent (CxA):** The qualified Commissioning Professional who administers the Cx process by managing the Cx team and overseeing the Commissioning Process. Where CxA is used in this specification it means the Commissioning Agent, members of his staff or appointed members of the commissioning team. Note that LEED uses the term Commissioning Authority in lieu of Commissioning Agent.

**Commissioning Checklists:** Lists of data or inspections to be verified to ensure proper system or component installation, operation, and function. Verification checklists are developed and used during all phases of the commissioning process to verify that the Owner's Project Requirements (OPR) is being achieved.

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**Commissioning Design Review:** The commissioning design review is a collaborative review of the design professionals design documents for items pertaining to the following: owner's project requirements; basis of design; operability and maintainability (O&M) including documentation; functionality; training; energy efficiency, control systems' sequence of operations including building automation system features; commissioning specifications and the ability to functionally test the systems.

**Commissioning Issue:** A condition identified by the Commissioning Agent or other member of the Commissioning Team that adversely affects the commission ability, operability, maintainability, or functionality of a system, equipment, or component. A condition that is in conflict with the Contract Documents and/or performance requirements of the installed systems and components. (See also - Commissioning Observation).

**Commissioning Manager (CxM):** A qualified individual appointed by the Contractor to manage the commissioning process on behalf of the Contractor.

**Commissioning Observation:** An issue identified by the Commissioning Agent or other member of the Commissioning Team that does not conform to the project OPR, contract documents or standard industry best practices. (See also Commissioning Issue)

**Commissioning Plan:** A document that outlines the commissioning process, commissioning scope and defines responsibilities, processes, schedules, and the documentation requirements of the Commissioning Process.

**Commissioning Process:** A quality focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems, components, and assemblies are planned, designed, installed, tested, can be operated, and maintained to meet the Owner's Project Requirements.

**Commissioning Report:** The final commissioning document which presents the commissioning process results for the project. Cx reports include an executive summary, the commissioning plan, issue log, correspondence, and all appropriate check sheets and test forms.

**Commissioning Representative (CxR):** An individual appointed by a sub-contractor to manage the commissioning process on behalf of the sub-contractor.

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**Commissioning Specifications:** The contract documents that detail the objective, scope and implementation of the commissioning process as developed in the Commissioning Plan.

**Commissioning Team:** Individual team members whose coordinated actions are responsible for implementing the Commissioning Process.

**Construction Phase Commissioning:** All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

**Contract Documents (CD):** Contract documents include design and construction contracts, price agreements and procedure agreements. Contract Documents also include all final and complete drawings, specifications and all applicable contract modifications or supplements.

**Construction Phase Commissioning (CPC):** All commissioning efforts executed during the construction process after the design phase and prior to the Acceptance Phase Commissioning.

**Coordination Drawings:** Drawings showing the work of all trades that are used to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances. On mechanical projects, coordination drawings include structural steel, ductwork, major piping and electrical conduit and show the elevations and locations of the above components.

**Data Logging:** The monitoring and recording of temperature, flow, current, status, pressure, etc. of equipment using stand-alone data recorders.

**Deferred System Test:** Tests that cannot be completed at the end of the acceptance phase due to ambient conditions, schedule issues or other conditions preventing testing during the normal acceptance testing period.

**Deficiency:** See "Commissioning Issue".

**Design Criteria:** A listing of the VA Design Criteria outlining the project design requirements, including its source. These are used during the design process to show the design elements meet the OPR.

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**Design Intent:** The overall term that includes the OPR and the BOD. It is a detailed explanation of the ideas, concepts, and criteria that are defined by the owner to be important. The design intent documents are utilized to provide a written record of these ideas, concepts and criteria.

**Design Narrative:** A written description of the proposed design solutions that satisfy the requirements of the OPR.

**Design Phase Commissioning (DPC):** All commissioning tasks executed during the design phase of the project.

**Environmental Systems:** Systems that use a combination of mechanical equipment, airflow, water flow and electrical energy to provide heating, ventilating, air conditioning, humidification, and dehumidification for the purpose of human comfort or process control of temperature and humidity.

**Executive Summary:** A section of the Commissioning report that reviews the general outcome of the project. It also includes any unresolved issues, recommendations for the resolution of unresolved issues and all deferred testing requirements.

**Functionality:** This defines a design component or construction process which will allow a system or component to operate or be constructed in a manner that will produce the required outcome of the OPR.

**Functional Test Procedure (FTP):** A written protocol that defines methods, steps, personnel, and acceptance criteria for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

**Industry Accepted Best Practice:** A design component or construction process that has achieved industry consensus for quality performance and functionality. Refer to the current edition of the NEBB Design Phase Commissioning Handbook for examples.

**Installation Verification:** Observations or inspections that confirm the system or component has been installed in accordance with the contract documents and to industry accepted best practices.

**Integrated System Testing:** Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to



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loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.

Issues Log: A formal and ongoing record of problems or concerns - and their resolution - that have been raised by members of the Commissioning Team during the course of the Commissioning Process.

**Lessons Learned Workshop:** A workshop conducted to discuss and document project successes and identify opportunities for improvements for future projects.

**Maintainability:** A design component or construction process that will allow a system or component to be effectively maintained. This includes adequate room for access to adjust and repair the equipment. Maintainability also includes components that have readily obtainable repair parts or service.

**Manual Test:** Testing using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the 'observation').

**Owner's Project Requirements (OPR):** A written document that details the project requirements and the expectations of how the building and its systems will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

**Precision:** The ability of an instrument to produce repeatable readings of the same quantity under the same conditions. The precision of an instrument refers to its ability to produce a tightly grouped set of values around the mean value of the measured quantity.

**Pre-Design Phase Commissioning:** Commissioning tasks performed prior to the commencement of design activities that includes project programming and the development of the commissioning process for the project

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**Pre-Functional Checklist (PFC):** A form used by the contractor to verify that appropriate components are onsite, correctly installed, set up, calibrated, functional and ready for functional testing.

**Pre-Functional Test (PFT):** An inspection or test that is done before functional testing. PFT's include installation verification and system and component start up tests.

**Procedure or Protocol:** A defined approach that outlines the execution of a sequence of work or operations. Procedures are used to produce repeatable and defined results.

**Range:** The upper and lower limits of an instrument's ability to measure the value of a quantity for which the instrument is calibrated.

**Resolution:** This word has two meanings in the Cx Process. The first refers to the smallest change in a measured variable that an instrument can detect. The second refers to the implementation of actions that correct a tested or observed deficiency.

**Site Observation Visit:** On-site inspections and observations made by the Commissioning Agent for the purpose of verifying component, equipment, and system installation, to observe contractor testing, equipment start-up procedures, or other purposes.

**Site Observation Reports (SO):** Reports of site inspections and observations made by the Commissioning Agent. Observation reports are intended to provide early indication of an installation issue which will need correction or analysis.

**Special System Inspections:** Inspections required by a local code authority prior to occupancy and are not normally a part of the commissioning process.

**Static Tests:** Tests or inspections that validate a specified static condition such as pressure testing. Static tests may be specification or code initiated.

**Start Up Tests:** Tests that validate the component or system is ready for automatic operation in accordance with the manufactures requirements.

**Systems Manual:** A system-focused composite document that includes all information required for the owners operators to operate the systems.

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**Test Procedure:** A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

**Testing:** The use of specialized and calibrated instruments to measure parameters such as: temperature, pressure, vapor flow, air flow, fluid flow, rotational speed, electrical characteristics, velocity, and other data in order to determine performance, operation, or function.

**Thermal Scans:** Thermographic pictures taken with an Infrared Thermographic Camera. Thermographic pictures show the relative temperatures of objects and surfaces and are used to identify leaks, thermal bridging, thermal intrusion, electrical overload conditions, moisture containment, and insulation failure.

**Training Plan:** A written document that details, in outline form the expectations of the operator training. Training agendas should include instruction on how to obtain service, operate, startup, shutdown and maintain all systems and components of the project.

**Trending:** Monitoring over a period of time with the building automation system.

**Unresolved Commissioning Issue:** Any Commissioning Issue that, at the time that the Final Report or the Amended Final Report is issued that has not been either resolved by the construction team or accepted by the VA. **Validation:** The process by which work is verified as complete and operating correctly:

1. First party validation occurs when a firm or individual verifying the task is the same firm or individual performing the task.
2. Second party validation occurs when the firm or individual verifying the task is under the control of the firm performing the task or has other possibilities of financial conflicts of interest in the resolution (Architects, Designers, General Contractors and Third Tier Subcontractors or Vendors).
3. Third party validation occurs when the firm verifying the task is not associated with or under control of the firm performing or designing the task.

**Verification:** The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are

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confirmed to comply with the criteria described in the Owner's Project Requirements.

**1.7 SYSTEMS TO BE COMMISSIONED**

A. Commissioning of a system or systems specified for this project is part of the construction process. Documentation and testing of these systems, as well as training of the VA's Operation and Maintenance personnel, is required in cooperation with the VA and the Commissioning Agent.

B. The following systems will be commissioned as part of this project:

<b>Electrical</b>	
Medium-Voltage Electrical Distribution Systems	Medium-Voltage Switchgear, Medium-Voltage Switches, Underground ductbank and distribution, Pad-Mount Transformers, Medium-Voltage Load Interrupter Switches,
Grounding & Bonding Systems	Review reports
Electric Power Monitoring Systems	Metering, sub-metering, power monitoring systems, PLC control systems
Electrical System Protective Device Study	Review reports, verify field settings consistent with Study
Secondary Unit Substations	Medium-voltage components, transformers, low-voltage distribution, verify breaker testing results (injection current, etc)
Low-Voltage Distribution System	Normal power distribution system, Life-safety power distribution system, critical power distribution system, equipment power distribution system, switchboards, distribution panels, panelboards, verify breaker testing results (injection current, etc)

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Emergency Power Generation Systems	Generators, Generator paralleling switchgear, automatic transfer switches, PLC and other control systems
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**1.8 COMMISSIONING TEAM**

- A. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project Superintendent and subcontractors, installers, schedulers, suppliers, and specialists deemed appropriate by the Department of Veterans Affairs (VA) and Commissioning Agent.
- B. Members Appointed by Contractor:
1. Contractor' Commissioning Manager: The designated person, company, or entity that plans, schedules and coordinates the commissioning activities for the construction team.
  2. Contractor's Commissioning Representative(s): Individual(s), each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions.
- C. Members Appointed by VA:
1. Commissioning Agent: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. The VA will engage the CxA under a separate contract.
  2. User: Representatives of the facility user and operation and maintenance personnel.
  3. A/E: Representative of the Architect and engineering design professionals.

**1.11 COMMISSIONING AGENT'S RESPONSIBILITIES**

- A. Organize and lead the commissioning team.
- B. Prepare the commissioning plan. See Paragraph 1.11-A of this specification Section for further information.
- C. Review and comment on selected submittals from the Contractor for general conformance with the Construction Documents. Review and comment on the ability to test and operate the system and/or equipment, including providing gages, controls and other components required to operate, maintain, and test the system. Review and comment on

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performance expectations of systems and equipment and interfaces between systems relating to the Construction Documents.

- D. Conduct an initial construction phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; Pre-Functional Checklists, Systems Functional Performance Testing; and project completion.
- E. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss status of the commissioning processes.
- F. Observe construction and report progress, observations and issues. Observe systems and equipment installation for adequate accessibility for maintenance and component replacement or repair, and for general conformance with the Construction Documents.
- G. Prepare Project specific Pre-Functional Checklists and Systems Functional Performance Test procedures.
- H. Coordinate Systems Functional Performance testing schedule with the Contractor.
- I. Witness selected systems startups.
- J. Verify selected Pre-Functional Checklists completed and submitted by the Contractor.
- K. Witness and document Systems Functional Performance Testing.
- L. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.
- M. Review and comment on operation and maintenance (O&M) documentation and systems manual outline for compliance with the Contract Documents. Operation and maintenance documentation requirements are specified in Paragraph 1.25, Section 01 00 00 GENERAL REQUIREMENTS.
- N. Review operation and maintenance training program developed by the Contractor. Verify training plans provide qualified instructors to conduct operation and maintenance training.
- O. Prepare commissioning Field Observation Reports.
- P. Prepare the Final Commissioning Report.
- Q. Assemble the final commissioning documentation, including the Final Commissioning Report and Addendum to the Final Commissioning Report.

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**1.12 COMMISSIONING DOCUMENTATION**

- A. Commissioning Plan: A document, prepared by Commissioning Agent, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited, to the following:
1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
  2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
  3. Identification of systems and equipment to be commissioned.
  4. Schedule of Commissioning Coordination meetings.
  5. Identification of items that must be completed before the next operation can proceed.
  6. Description of responsibilities of commissioning team members.
  7. Description of observations to be made.
  8. Description of requirements for operation and maintenance training.
  9. Schedule for commissioning activities with dates coordinated with overall construction schedule.
  10. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
  11. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.
  12. Preliminary Systems Functional Performance Test procedures.
- B. Systems Functional Performance Test Procedures: The Commissioning Agent will develop Systems Functional Performance Test Procedures for each system to be commissioned, including subsystems, or equipment and interfaces or interlocks with other systems. Systems Functional Performance Test Procedures will include a separate entry, with space for comments, for each item to be tested. Preliminary Systems Functional Performance Test Procedures will be provided to the VA,

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Architect/Engineer, and Contractor for review and comment. The Systems Performance Test Procedure will include test procedures for each mode of operation and provide space to indicate whether the mode under test responded as required. Each System Functional Performance Test procedure, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:

1. Name and identification code of tested system.
2. Test number.
3. Time and date of test.
4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
5. Dated signatures of the person performing test and of the witness, if applicable.
6. Individuals present for test.
7. Observations and Issues.
8. Issue number, if any, generated as the result of test.

C. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent will spot check Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.

D. Test and Inspection Reports: The Commissioning Agent will record test data, observations, and measurements on Systems Functional Performance Test Procedure. The report will also include recommendation for system acceptance or non-acceptance. Photographs, forms, and other means appropriate for the application shall be included with data. Commissioning Agent Will compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.

F. Commissioning Issues Log: The Commissioning Agent will prepare and maintain Commissioning Issues Log that describes Commissioning Issues and Commissioning Observations that are identified during the Commissioning process. These observations and issues include, but are



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not limited to, those that are at variance with the Contract Documents. The Commissioning Issues Log will identify and track issues as they are encountered, the party responsible for resolution, progress toward resolution, and document how the issue was resolved. The Master Commissioning Issues Log will also track the status of unresolved issues.

1. Creating a Commissioning Issues Log Entry:

- a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
- b. Assign a descriptive title for the issue.
- c. Identify date and time of the issue.
- d. Identify test number of test being performed at the time of the observation, if applicable, for cross reference.
- e. Identify system, subsystem, and equipment to which the issue applies.
- f. Identify location of system, subsystem, and equipment.
- g. Include information that may be helpful in diagnosing or evaluating the issue.
- h. Note recommended corrective action.
- i. Identify commissioning team member responsible for corrective action.
- j. Identify expected date of correction.
- k. Identify person that identified the issue.

2. Documenting Issue Resolution:

- a. Log date correction is completed or the issue is resolved.
- b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
- c. Identify changes to the Contract Documents that may require action.
- d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.
- e. Identify person(s) who corrected or resolved the issue.
- f. Identify person(s) verifying the issue resolution.

G. Final Commissioning Report: The Commissioning Agent will document results of the commissioning process, including unresolved issues, and

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performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been properly installed and are performing according to the Contract Documents. This report will be used by the Department of Veterans Affairs when determining that systems will be accepted. This report will be used to evaluate systems, subsystems, and equipment and will serve as a future reference document during VA occupancy and operation. It shall describe components and performance that exceed requirements of the Contract Documents and those that do not meet requirements of the Contract Documents. The commissioning report will include, but is not limited to, the following:

1. Lists and explanations of substitutions; compromises; variances with the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. Design Narrative documentation maintained by the Commissioning Agent.
2. Commissioning plan.
3. Pre-Functional Checklists completed by the Contractor, with annotation of the Commissioning Agent review and spot check.
4. Systems Functional Performance Test Procedures, with annotation of test results and test completion.
5. Commissioning Issues Log.
6. Listing of deferred and off season test(s) not performed, including the schedule for their completion.

**1.13 SUBMITTALS**

A. Preliminary Commissioning Plan Submittal: The Commissioning Agent has prepared a Preliminary Commissioning Plan based on the final Construction Documents. The Preliminary Commissioning Plan is included as an Appendix to this specification section. The Preliminary Commissioning Plan is provided for information only. It contains preliminary information about the following commissioning activities:

1. The Commissioning Team: A list of commissioning team members by organization.
2. Systems to be commissioned. A detailed list of systems to be commissioned for the project. This list also provides preliminary information on systems/equipment submittals to be reviewed by the Commissioning Agent; preliminary information on Pre-Functional

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Checklists that are to be completed; preliminary information on Systems Performance Testing, including information on testing sample size (where authorized by the VA).

3. Commissioning Team Roles and Responsibilities: Preliminary roles and responsibilities for each Commissioning Team member.
  4. Commissioning Documents: A preliminary list of commissioning-related documents, include identification of the parties responsible for preparation, review, approval, and action on each document.
  5. Commissioning Activities Schedule: Identification of Commissioning Activities, including Systems Functional Testing, the expected duration and predecessors for the activity.
  6. Pre-Functional Checklists: Preliminary Pre-Functional Checklists for equipment, components, subsystems, and systems to be commissioned. These Preliminary Pre-Functional Checklists provide guidance on the level of detailed information the Contractor shall include on the final submission.
  7. Systems Functional Performance Test Procedures: Preliminary step-by-step System Functional Performance Test Procedures to be used during Systems Functional Performance Testing. These Preliminary Systems Functional Performance procedures provide information on the level of testing rigor, and the level of Contractor support required during performance of system's testing.
- B. Final Commissioning Plan Submittal: Based on the Final Construction Documents and the Contractor's project team, the Commissioning Agent will prepare the Final Commissioning Plan as described in this section. The Commissioning Agent will submit three hard copies and three sets of electronic files of Final Commissioning Plan. The Contractor shall review the Commissioning Plan and provide any comments to the VA. The Commissioning Agent will incorporate review comments into the Final Commissioning Plan as directed by the VA.
- C. Systems Functional Performance Test Procedure: The Commissioning Agent will submit preliminary Systems Functional Performance Test Procedures to the Contractor, and the VA for review and comment. The Contractor shall return review comments to the VA and the Commissioning Agent. The VA will also return review comments to the Commissioning Agent. The Commissioning Agent will incorporate review comments into the Final

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Systems Functional Test Procedures to be used in Systems Functional Performance Testing.

- D. Pre-Functional Checklists: The Commissioning Agent will submit Pre-Functional Checklists to be completed by the Contractor.
- E. Test and Inspection Reports: The Commissioning Agent will submit test and inspection reports to the VA with copies to the Contractor and the Architect/Engineer.
- F. Corrective Action Documents: The Commissioning Agent will submit corrective action documents to the VA COR with copies to the Contractor and Architect.
- G. Preliminary Commissioning Report Submittal: The Commissioning Agent will submit three electronic copies of the preliminary commissioning report. One electronic copy, with review comments, will be returned to the Commissioning Agent for preparation of the final submittal.
- H. Final Commissioning Report Submittal: The Commissioning Agent will submit four sets of electronically formatted information of the final commissioning report to the VA. The final submittal will incorporate comments as directed by the VA.
- I. Data for Commissioning:
  - 1. The Commissioning Agent will request in writing from the Contractor specific information needed about each piece of commissioned equipment or system to fulfill requirements of the Commissioning Plan.
  - 2. The Commissioning Agent may request further documentation as is necessary for the commissioning process or to support other VA data collection requirements, including Construction Operations Building Information Exchange (COBIE), Building Information Modeling (BIM), etc.

**1.14 COMMISSIONING PROCESS**

- A. The Commissioning Agent will be responsible for the overall management of the commissioning process as well as coordinating scheduling of commissioning tasks with the VA and the Contractor. As directed by the VA, the Contractor shall incorporate Commissioning tasks, including, but not limited to, Systems Functional Performance Testing (including predecessors) with the Master Construction Schedule.

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**1.15 QUALITY ASSURANCE**

- A. Instructor Qualifications: Factory authorized service representatives shall be experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.
- B. Test Equipment Calibration: The Contractor shall comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

**1.16 COORDINATION**

- A. Management: The Commissioning Agent will coordinate the commissioning activities with the VA and Contractor. The Commissioning Agent will submit commissioning documents and information to the VA. All commissioning team members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- B. Scheduling: The Contractor shall work with the Commissioning Agent and the VA to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient information (including, but not limited to, tasks, durations and predecessors) on commissioning activities to allow the Contractor and the VA to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction as directed by the VA.
- C. Initial Schedule of Commissioning Events: The Commissioning Agent will provide the initial schedule of primary commissioning events in the Commissioning Plan and at the commissioning coordination meetings. The Commissioning Plan will provide a format for this schedule. As construction progresses, more detailed schedules will be developed by the Contractor with information from the Commissioning Agent.
- D. Commissioning Coordinating Meetings: The Commissioning Agent will conduct periodic Commissioning Coordination Meetings of the commissioning team to review status of commissioning activities, to

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discuss scheduling conflicts, and to discuss upcoming commissioning process activities.

- E. Pretesting Meetings: The Commissioning Agent will conduct pretest meetings of the commissioning team to review startup reports, Pre-Functional Checklist results, Systems Functional Performance Testing procedures, testing personnel and instrumentation requirements.
- F. Systems Functional Performance Testing Coordination: The Contractor shall coordinate testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. The Contractor shall coordinate the schedule times for tests, inspections, obtaining samples, and similar activities.

**PART 2 - PRODUCTS**

**2.1 TEST EQUIPMENT**

- A. The Contractor shall provide all standard and specialized testing equipment required to perform Systems Functional Performance Testing. Test equipment required for Systems Functional Performance Testing will be identified in the detailed System Functional Performance Test Procedure prepared by the Commissioning Agent.
- B. Data logging equipment and software required to test equipment shall be provided by the Contractor.
- C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. All equipment shall be calibrated according to the manufacturer's recommended intervals and following any repairs to the equipment. Calibration tags shall be affixed or certificates readily available.

**PART 3 - EXECUTION**

**3.1 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES**

- A. The following table outlines the roles and responsibilities for the Commissioning Team members during the Construction Phase:

Construction Phase	CxA = Commissioning Agent	L
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Commissioning Roles & Responsibilities		COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					P A R O
Category	Task Description	CxA	COR	A/E	PC	O&M	No
Meetings	Construction Commissioning Kick Off meeting	L	A	P	P	O	
	Commissioning Meetings	L	A	P	P	O	
	Project Progress Meetings	O	A	P	L	O	
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support the OPR and BOD.	P	A	L	P	N/A	
Cx Plan & Spec	Final Commissioning Plan	L	A	R	R	O	
Schedules	Duration Schedule for Commissioning Activities	L	A	R	R	N/A	
OPR and BOD	Maintain OPR on behalf of Owner	R	A	L	R	O	
	Maintain BOD/DID on behalf of Owner	R	A	L	R	O	
Document Reviews							
	Submittal and Shop Drawing Review	R	A	R	L	O	
	Review Contractor Equipment Startup Checklists	L	A	R	R	N/A	
	Review Change Orders, ASI, and RFI	R	A	L	R	N/A	
Site Observations	Witness Factory Testing	P	A	P	L	O	
	Construction Observation Site Visits	R	A	L	R	O	
Functional Test Protocols	Final Pre-Functional Checklists	L	A	R	R	O	
	Final Functional Performance Test Protocols	L	A	R	R	O	

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Construction Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L P A R O
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	No
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
Reports and Logs	Status Reports	L	A	R	R	O	
	Maintain Commissioning Issues Log	L	A	R	R	O	

B. The following table outlines the roles and responsibilities for the Commissioning Team members during the Acceptance Phase:

Acceptance Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L P A R O
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	No
Meetings	Commissioning Meetings	L	A	P	P	O	
	Project Progress Meetings	O	A	P	L	O	
	Pre-Test Coordination Meeting	L	A	P	P	O	



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Acceptance Phase		CxA = Commissioning Agent COR = Contracting Officer's Representative A/E = Design Arch/Engineer PC = Prime Contractor O&M = Gov't Facility O&M					L P A R O
Commissioning Roles & Responsibilities							
Category	Task Description	CxA	COR	A/E	PC	O&M	No
	Lessons Learned and Commissioning Report Review Meeting	P	A	L	P	O	
Coordination	Coordinate with [OGC's, AHJ, Vendors, etc.] to ensure that Cx interacts properly with other systems as needed to support OPR and BOD	P	P	L	P	O	
Cx Plan & Spec	Maintain/Update Commissioning Plan	L	A	R	R	O	
Schedules	Prepare Functional Test Schedule	L	A	R	R	O	
OPR and BOD	Maintain OPR on behalf of Owner	R	A	L	R	O	
	Maintain BOD/DID on behalf of Owner	R	A	L	R	O	
Document Reviews	Review Completed Pre-Functional Checklists	L	A	R	R	O	
	Pre-Functional Checklist Verification	L	A	R	R	O	
	Review Operations & Maintenance Manuals	R	A	L	R	R	
	Training Plan Review	R	A	L	R	R	
	Warranty Review	R	A	L	R	O	
Site Observations	Construction Observation Site Visits	R	A	L	R	O	
	Witness Selected Equipment Startup	L	A	R	R	O	
Functional Test Protocols							
	Systems Functional Performance Testing	L	A	P	P	P	
	Retesting	L	A	P	P	P	
Technical Activities	Issues Resolution Meetings	P	A	P	L	O	
	Systems Training	R	S	L	P	P	
Reports and	Status Reports	L	A	R	R	O	

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Acceptance Phase		CxA = Commissioning Agent					L
Commissioning Roles & Responsibilities		COR = Contracting Officer's Representative					P
		A/E = Design Arch/Engineer					A
		PC = Prime Contractor					R
		O&M = Gov't Facility O&M					O
Category	Task Description	CxA	COR	A/E	PC	O&M	No
Logs	Maintain Commissioning Issues Log	L	A	R	R	O	
	Final Commissioning Report	L	A	R	R	R	
	Prepare Systems Manuals	R	A	L	R	R	

### 3.2 STARTUP, INITIAL CHECKOUT, AND PRE-FUNCTIONAL CHECKLISTS

A. The following procedures shall apply to all equipment and systems to be commissioned, according to Part 1, Systems to Be Commissioned.

1. Pre-Functional Checklists are important to ensure that the equipment and systems are hooked up and operational. These ensure that Systems Functional Performance Testing may proceed without unnecessary delays. Each system to be commissioned shall have a full Pre-Functional Checklist completed by the Contractor prior to Systems Functional Performance Testing. No sampling strategies are used.
  - a. The Pre-Functional Checklist will identify the trades responsible for completing the checklist. The Contractor shall ensure the appropriate trades complete the checklists.
  - b. The Commissioning Agent will review completed Pre-Functional Checklists and field-verify the accuracy of the completed checklist using sampling techniques.
2. Startup and Initial Checkout Plan: The Contractor shall develop detailed startup plans for all equipment. The primary role of the Contractor in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures have been completed. Parties responsible for startup shall be identified in the Startup Plan and in the checklist forms.
  - a. The Contractor shall develop the full startup plan by combining (or adding to) the checklists with the manufacturer's detailed

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startup and checkout procedures from the O&M manual data and the field checkout sheets normally used by the Contractor. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.

- b. The full startup plan shall at a minimum consist of the following items:
    - 1) The Pre-Functional Checklists.
    - 2) The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
    - 3) The manufacturer's normally used field checkout sheets.
  - c. The Commissioning Agent will submit the full startup plan to the VA and Contractor for review. Final approval will be by the VA.
  - d. The Contractor shall review and evaluate the procedures and the format for documenting them, noting any procedures that need to be revised or added.
3. Execution of Equipment Startup
- a. Four weeks prior to equipment startup, the Contractor shall schedule startup and checkout with the VA and Commissioning Agent. The performance of the startup and checkout shall be directed and executed by the Contractor.
  - b. The Commissioning Agent will observe the startup procedures for selected pieces of primary equipment.
  - c. The Contractor shall execute startup and provide the VA and Commissioning Agent with a signed and dated copy of the completed startup checklists, and contractor tests.
  - d. Only individuals that have direct knowledge and witnessed that a line item task on the Startup Checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

**3.3 DEFICIENCIES, NONCONFORMANCE, AND APPROVAL IN CHECKLISTS AND STARTUP**

- A. The Contractor shall clearly list any outstanding items of the initial startup and Pre-Functional Checklist procedures that were not completed successfully, at the bottom of the procedures form or on an attached

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sheet. The procedures form and any outstanding deficiencies shall be provided to the VA and the Commissioning Agent within two days of completion.

- B. The Commissioning Agent will review the report and submit comments to the VA. The Commissioning Agent will work with the Contractor to correct and verify deficiencies or uncompleted items. The Commissioning Agent will involve the VA and others as necessary. The Contractor shall correct all areas that are noncompliant or incomplete in the checklists in a timely manner, and shall notify the VA and Commissioning Agent as soon as outstanding items have been corrected. The Contractor shall submit an updated startup report and a Statement of Correction on the original noncompliance report. When satisfactorily completed, the Commissioning Agent will recommend approval of the checklists and startup of each system to the VA.
- C. The Contractor shall be responsible for resolution of deficiencies as directed the VA.

**3.6 SYSTEMS FUNCTIONAL PERFORMANCE TESTING**

- A. This paragraph applies to Systems Functional Performance Testing of systems for all referenced specification Divisions.
- B. Objectives and Scope: The objective of Systems Functional Performance Testing is to demonstrate that each system is operating according to the Contract Documents. Systems Functional Performance Testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of noncompliant performance are identified and corrected, thereby improving the operation and functioning of the systems. In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, fire alarm and emergency power) where there is a specified system response. The Contractor shall verify each sequence in the sequences of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.
- C. Development of Systems Functional Performance Test Procedures: Before Systems Functional Performance Test procedures are written, the Contractor shall submit all requested documentation and a current list

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of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements found in the Contract Documents and approved submittals and shop drawings, the Commissioning Agent will develop specific Systems Functional Test Procedures to verify and document proper operation of each piece of equipment and system to be commissioned. The Contractor shall assist the Commissioning Agent in developing the Systems Functional Performance Test procedures as requested by the Commissioning Agent i.e. by answering questions about equipment, operation, sequences, etc. Prior to execution, the Commissioning Agent will provide a copy of the Systems Functional Performance Test procedures to the VA, the Architect/Engineer, and the Contractor, who shall review the tests for feasibility, safety, equipment and warranty protection.

D. Purpose of Test Procedures: The purpose of each specific Systems Functional Performance Test is to verify and document compliance with the stated criteria of acceptance given on the test form. Representative test formats and examples are found in the Commissioning Plan for this project. (The Commissioning Plan is issued as a separate document and is available for review.) The test procedure forms developed by the Commissioning Agent will include, but not be limited to, the following information:

1. System and equipment or component name(s)
2. Equipment location and ID number
3. Unique test ID number, and reference to unique Pre-Functional Checklists and startup documentation, and ID numbers for the piece of equipment
4. Date
5. Project name
6. Participating parties
7. A copy of the specification section describing the test requirements
8. A copy of the specific sequence of operations or other specified parameters being verified
9. Formulas used in any calculations
10. Required pretest field measurements
11. Instructions for setting up the test.

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12. Special cautions, alarm limits, etc.
  13. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
  14. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
  15. A section for comments.
  16. Signatures and date block for the Commissioning Agent. A place for the Contractor to initial to signify attendance at the test.
- E. Test Methods: Systems Functional Performance Testing shall be achieved by manual testing (i.e. persons manipulate the equipment and observe performance) and/or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by standalone data loggers. The Contractor and Commissioning Agent shall determine which method is most appropriate for tests that do not have a method specified.
1. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, although timing the testing to experience actual conditions is encouraged wherever practical.
  2. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.
  3. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent

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actual conditions and responses. Much of this verification shall be completed during systems startup and initial checkout.

- F. Setup: Each function and test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pretest condition.
- G. Sampling: No sampling is allowed in completing Pre-Functional Checklists. Sampling is allowed for Systems Functional Performance Test Procedures execution. The Commissioning Agent will determine the sampling rate. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Agent may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with Systems Functional Performance Testing of the remaining units.
- H. Cost of Retesting: The cost associated with expanded sample System Functional Performance Tests shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- I. Coordination and Scheduling: The Contractor shall provide a minimum of 7 days' notice to the Commissioning Agent and the VA regarding the completion schedule for the Pre-Functional Checklists and startup of all equipment and systems. The Commissioning Agent will schedule Systems Functional Performance Tests with the Contractor and VA. The Commissioning Agent will witness and document the Systems Functional Performance Testing of systems. The Contractor shall execute the tests in accordance with the Systems Functional Performance Test Procedure.
- J. Testing Prerequisites: In general, Systems Functional Performance Testing will be conducted only after Pre-Functional Checklists have been satisfactorily completed. Systems Functional Performance Testing will proceed from components to subsystems to systems. When the proper

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performance of all interacting individual systems has been achieved,  
the interface or coordinated responses between systems will be checked.

- K. Problem Solving: The Commissioning Agent will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractor.

**3.7 DOCUMENTATION, NONCONFORMANCE AND APPROVAL OF TESTS**

- A. Documentation: The Commissioning Agent will witness, and document the results of all Systems Functional Performance Tests using the specific procedural forms developed by the Commissioning Agent for that purpose. Prior to testing, the Commissioning Agent will provide these forms to the VA and the Contractor for review and approval. The Contractor shall include the filled out forms with the O&M manual data.

- B. Nonconformance: The Commissioning Agent will record the results of the Systems Functional Performance Tests on the procedure or test form. All items of nonconformance issues will be noted and reported to the VA on Commissioning Field Reports and/or the Commissioning Master Issues Log.

1. Corrections of minor items of noncompliance identified may be made during the tests. In such cases, the item of noncompliance and resolution shall be documented on the Systems Functional Test Procedure.
2. Every effort shall be made to expedite the systems functional Performance Testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Agent shall not be pressured into overlooking noncompliant work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so by direction from the VA.
3. As the Systems Functional Performance Tests progresses and an item of noncompliance is identified, the Commissioning Agent shall discuss the issue with the Contractor and the VA.
4. When there is no dispute on an item of noncompliance, and the Contractor accepts responsibility to correct it:
  - a. The Commissioning Agent will document the item of noncompliance and the Contractor's response and/or intentions. The Systems Functional Performance Test then continues or proceeds to another test or sequence. After the day's work is complete, the



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Commissioning Agent will submit a Commissioning Field Report to the VA. The Commissioning Agent will also note items of noncompliance and the Contractor's response in the Master Commissioning Issues Log. The Contractor shall correct the item of noncompliance and report completion to the VA and the Commissioning Agent.

- b. The need for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test and the test shall be repeated.
5. If there is a dispute about item of noncompliance, regarding whether it is an item of noncompliance, or who is responsible:
  - a. The item of noncompliance shall be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor's response shall also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.
  - b. Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive and acceptance authority is with the Department of Veterans Affairs.
  - c. The Commissioning Agent will document the resolution process.
  - d. Once the interpretation and resolution have been decided, the Contractor shall correct the item of noncompliance, report it to the Commissioning Agent. The requirement for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test. Retesting shall be repeated until satisfactory performance is achieved.
- C. Cost of Retesting: The cost to retest a System Functional Performance Test shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- D. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a

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difference) of equipment fail to perform in compliance with the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance specifications, all identical units may be considered unacceptable by the VA. In such case, the Contractor shall provide the VA with the following:

1. Within one week of notification from the VA, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the VA within two weeks of the original notice.
  2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
  3. The VA shall determine whether a replacement of all identical units or a repair is acceptable.
  4. Two examples of the proposed solution shall be installed by the Contractor and the VA shall be allowed to test the installations for up to one week, upon which the VA will decide whether to accept the solution.
  5. Upon acceptance, the Contractor shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.
- E. Approval: The Commissioning Agent will note each satisfactorily demonstrated function on the test form. Formal approval of the Systems Functional Performance Test shall be made later after review by the Commissioning Agent and by the VA. The Commissioning Agent will evaluate each test and report to the VA using a standard form. The VA will give final approval on each test using the same form, and provide signed copies to the Commissioning Agent and the Contractor.

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**3.8 DEFERRED TESTING**

- A. Unforeseen Deferred Systems Functional Performance Tests: If any Systems Functional Performance Test cannot be completed due to the building structure, required occupancy condition or other conditions, execution of the Systems Functional Performance Testing may be delayed upon approval of the VA. These Systems Functional Performance Tests shall be conducted in the same manner as the seasonal tests as soon as possible. Services of the Contractor to conduct these unforeseen Deferred Systems Functional Performance Tests shall be negotiated between the VA and the Contractor.
- B. Deferred Seasonal Testing: Deferred Seasonal Systems Functional Performance Tests are those that must be deferred until weather conditions are closer to the systems design parameters. The Commissioning Agent will review systems parameters and recommend which Systems Functional Performance Tests should be deferred until weather conditions more closely match systems parameters. The Contractor shall review and comment on the proposed schedule for Deferred Seasonal Testing. The VA will review and approve the schedule for Deferred Seasonal Testing. Deferred Seasonal Systems Functional Performances Tests shall be witnessed and documented by the Commissioning Agent. Deferred Seasonal Systems Functional Performance Tests shall be executed by the Contractor in accordance with these specifications.

**3.9 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS**

- A. Training Preparation Conference: Before operation and maintenance training, the Contractor will convene a training preparation conference to include VA's COR, VA's Operations, Commissioning Agent and Maintenance personnel. The purpose of this conference will be to discuss and plan for Training and Demonstration of VA Operations and Maintenance personnel.
- B. The Contractor shall provide training and demonstration as required by Division 26 section. The Training and Demonstration shall include, but is not limited to, the following:
1. Review the Contract Documents.
  2. Review installed systems, subsystems, and equipment.
  3. Review instructor qualifications.
  4. Review instructional methods and procedures.

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5. Review training module outlines and contents.
  6. Review course materials (including operation and maintenance manuals).
  7. Review and discuss locations and other facilities required for instruction.
  8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
  9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.
- C. Training Module Submittals: The Contractor shall submit the following information to the VA and the Commissioning Agent:
1. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module. At completion of training, submit two complete training manuals for VA's use.
  2. Qualification Data: Submit qualifications for facilitator and/or instructor.
  3. Attendance Record: For each training module, submit list of participants and length of instruction time.
  4. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.
  5. Demonstration and Training Recording:
    - a. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
    - b. Video Format: Provide high quality color DVD color on standard size DVD disks or USB drives.

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- c. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
  - d. Narration: Describe scenes on video recording by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
  - e. Submit two copies within seven days of end of each training module.
6. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding videotape. Include name of Project and date of videotape on each page.

**D. Quality Assurance:**

- 1. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- 2. Instructor Qualifications: A factory authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- 3. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.

**E. Training Coordination:**

- 1. Coordinate instruction schedule with VA's operations. Adjust schedule as required to minimize disrupting VA's operations.
- 2. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- 3. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the VA.

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F. Instruction Program:

1. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
  - a. Electrical service and distribution, including switchgear, transformers, switchboards, panelboards, and motor controls.
  - k. Packaged engine generators, including synchronizing switchgear/switchboards, and transfer switches.

G. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participants are expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria:

Include the following:

  - a. System, subsystem, and equipment descriptions.
  - b. Performance and design criteria if Contractor is delegated design responsibility.
  - c. Operating standards.
  - d. Regulatory requirements.
  - e. Equipment function.
  - f. Operating characteristics.
  - g. Limiting conditions.
  - h. Performance curves.
2. Documentation: Review the following items in detail:
  - a. Emergency manuals.
  - b. Operations manuals.
  - c. Maintenance manuals.
  - d. Project Record Documents.
  - e. Identification systems.
  - f. Warranties and bonds.
  - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:

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- a. Instructions on meaning of warnings, trouble indications, and error messages.
- b. Instructions on stopping.
- c. Shutdown instructions for each type of emergency.
- d. Operating instructions for conditions outside of normal operating limits.
- e. Sequences for electric or electronic systems.
- f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
  - a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning

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- e. Procedures for preventive maintenance.
- f. Procedures for routine maintenance.
- g. Instruction on use of special tools.
- 8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

H. Training Execution:

- 1. Preparation: Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual. Set up instructional equipment at instruction location.
- 2. Instruction:
  - a. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Department of Veterans Affairs for number of participants, instruction times, and location.
  - b. Instructor: Engage qualified instructors to instruct VA's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
    - 1) The Commissioning Agent will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
    - 2) The VA will furnish an instructor to describe VA's operational philosophy.
    - 3) The VA will furnish the Contractor with names and positions of participants.
- 3. Scheduling: Provide instruction at mutually agreed times. For equipment that requires seasonal operation, provide similar instruction at start of each season. Schedule training with the VA and the Commissioning Agent with at least seven days' advance notice.



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4. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, or a written, performance-based test.
5. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

**I. Demonstration and Training Recording:**

1. General: Engage a qualified commercial photographer to record demonstration and training. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. At beginning of each training module, record each chart containing learning objective and lesson outline.
2. Video Format: Provide high quality color DVD color on standard size DVD disks or USB drives.
3. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
4. Narration: Describe scenes on videotape by audio narration by microphone while demonstration and training is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

----- END -----



**DIVISION 02**

**EXISTING CONDITIONS**



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**SECTION 02 21 00**

**SITE SURVEYS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the gathering of research documents, performance of a property and topographic survey and preparation of a site survey map.

**1.2 DEFINITIONS**

- A. Professional Land Surveyor: One who possesses a valid state license as a "Professional Land Surveyor" from the state in which they practice.
- B. Professional Civil Engineer: One who possesses a valid state license as a "Professional Civil Engineer" from the state in which they practice. For this section, the term "surveyor" shall also include Professional Civil Engineers authorized to practice Land Surveying under the laws of the state in which they practice.

**PART 2 - EXECUTION**

- A. Contractor shall perform a site survey as directed in the Hines VA Dig Permit prior to any excavation activity.

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**SECTION 02 41 00**

**DEMOLITION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies demolition and removal of buildings, portions of buildings, utilities, other structures and debris from trash dumps shown.

**1.2 RELATED WORK:**

- A.
- A. Safety Requirements: Section 01 35 26 Safety Requirements Article, ACCIDENT PREVENTION PLAN (APP).
- B. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Construction Waste Management: Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.
- E. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7, INFECTION PREVENTION MEASURES.

**1.3 PROTECTION:**

- A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.
- C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.

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- D. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.
- E. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.
- F. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
3. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
  4. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.
- G. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center ; any damaged items shall be repaired or replaced as approved by the COR. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have COR's approval.
- I. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7 INFECTION PREVENTION MEASURES.

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**1.4 UTILITY SERVICES:**

- A. Demolish and remove outside utility service lines shown to be removed.
- B. Remove abandoned outside utility lines that would interfere with installation of new utility lines and new construction.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 DEMOLITION:**

- A. Completely demolish and remove buildings and structures, including all appurtenances related or connected thereto, as noted below:
  - 1. As required for installation of new utility service lines.
  - 2. To full depth within an area defined by hypothetical lines located 1500 mm (5 feet) outside building lines of new structures.
- B. Debris, including concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the COR. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 600 mm (24 inches) square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.
- C. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations be hauled to VA specified disposal site. All materials in the indicated trash dump areas, including above surrounding grade and extending to a depth of 1500mm (5feet) below surrounding grade, shall be included as part of the lump sum compensation for the work of this section. Materials that are located beneath the surface of the surrounding ground more than 1500 mm (5 feet), or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications.
- D. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code



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covering the specific utility and approved by the COR. When Utility lines are encountered that are not indicated on the drawings, the COR shall be notified prior to further work in that area.

**3.2 CLEAN-UP:**

On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to COR. Clean-up shall include off the Medical Center disposal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

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**SECTION 02 42 00**  
**CUTTING, REMOVAL, DEMOLITION, RESTORATION AND PATCHING**

**PART 1- GENERAL**

**1.1 SCOPE:**

- A. Refer to SECTION 01 00 00 for special requirements, protection, constraints, timing of work, scheduling of work, enclosures and similar requirements relating to this section.
- B. This section covers cutting, demolition, removal work, patching, leveling and restoration work as necessary to accomplish and complete all work under this contract, including any relocation or reuse of existing materials, equipment, systems, or other work, as well as the disposition of salvaged materials or debris. This Section applies to all work under this contract, including general construction, mechanical and electrical work.
- C. Contractor and his subcontractors shall examine the spaces/work site themselves to determine the actual conditions and requirements. All removals, demolition, cutting, restoration, new installations and other work shall be accomplished to transform the existing spaces and conditions to the new conditions required under the Contract, as well as to accomplish all tie-in work of new to existing.
- D. It is the intent that, unless specifically shown on the schedules, or is inherent in the work to be accomplished under the general construction work of the area, that each contractor shall perform the demolition, cutting, removals, relocations, patching and leveling, and restoration as will be required to accomplish the work under their contracts. All work indicated on the schedules shall be accomplished by the General Contractor.
  - 1. Except for general demolition of entire areas, it is the intent that at each area or space the contractor and each subcontractor shall make removals, perform cutting or demolition and accomplish relocations of work normal to his trade (i.e., Mechanical Contractor removes or relocates piping, ductwork and similar. At areas of general demolition of entire area spaces, the Mechanical Contractor shall make removals normal to their trade or may be called for, for reuse or relocation, make any relocations and cutoffs, terminate, or otherwise discontinue services that will be abandoned, shall be removed to the nearest active main. The general contractor shall then demolish or remove all unwanted electrical or mechanical materials, items or elements in the area.

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2. Contractor is required to restore all finishes, surfaces, items, & materials as required to accommodate new finishes. For example, if wall paper, vinyl wall covering, ceramic wall tile, etc. is existing on wall, and new wall finish calls for wall to be painted, contractor is required to remove existing wall paper, vinyl wall covering, ceramic wall tile, etc. to accommodate new painted finish. These surfaces are required to be verified prior to bid, as no change to contract will be provided after award if existing finishes are clearly present.

**PART 2: MATERIALS**

**2.1 SALVAGEABLE MATERIALS TO BE STORED BY OWNER (VA):**

- A. The owner shall mark or tag existing materials, equipment or other items that are to be retained during a pre-demolition walk through. Salvageable materials and items designated or marked to remain the property of the government shall be carefully removed by applicable trades, protected from damage and stored adjacent to the removal area as directed.
- B. Consult the Project Manager concerning any possible salvageable items prior to demolition thereof. Carefully remove and salvage any materials designated to be retained.
- C. Any materials not wanted by the government shall be removed from the site by the contractor, without additional cost to the government.
- D. Removal from the area and the site to the government's storage area shall be by the contractor.

**PART 3-EXECUTION:**

**3.1 TEMPORARY PROTECTION:**

- A. Provide protective covering and enclosures necessary to prevent damage to existing spaces and materials to remain.
- B. Provide dust proof temporary enclosures (including above ceilings) separating areas under demolition and remodeling from the remainder of the buildings as well as temporary filters at ductwork. If work produces fumes or odors that impact patient care or staff operations, granulated active carbon filters shall be provided for all HVAC intake units where operations provide these odors or fumes. Provide temporary hinged doors in temporary enclosures where necessary. Temporary and permanent doors shall be completely sealed with tape or other suitable material during demolition work and shall remain sealed until dust has

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settled.

**3.2 MECHANICAL AND ELECTRICAL WORK EXPOSED**

- A. Where unknown mechanical piping, ductwork or electrical conduit is exposed during removal of partitions, walls, floors and ceilings, the removal or re-routing shall be by the Mechanical or Electrical Contractor as applicable. The contractor is to provide at minimum labor and materials required for one journeyman electrician or plumber 40-manhours to relocate these utilities. Re-routed piping shall be located where directed and shall be re-connected to maintain all functions in proper operation. Abandoned piping may be left in place where it is disconnected from its source and capped or as directed by Project Manager. There shall be no "dead end" water, sewer, medical gas, or vent piping existing in the completed work.
- B. Removals, capping or otherwise terminating services which are abandoned or need to be abandoned, shall be accomplished without additional cost to the government, whether shown or noted on drawings or otherwise encountered.
- C. Contractor is to remove all old abandoned oval pneumatic tube lines, transfer boxes, and related equipment and components exposed within the construction area. The contractor is to provide at minimum labor and materials required for one electrician or laborer 40-manhours for removal.

**3.3 WORK OF EACH CONTRACT**

- A. The contractor and each subcontractor shall carefully review the contract documents, including those primarily for other trades, with respect to the coordination of demolition, removal and remodeling work and perform such removals normal to their respective trade as may be shown, noted, or otherwise required. Cutting and patching incidental to demolition, removal and/or remodeling of general construction work shall be construed as the work of the general contractor when shown or indicated on the general construction drawings or schedules or specifically noted or called for on documents primarily for other trades as being accomplished by the general contractor. Other contractors shall perform such other cutting, demolition, patching, replacement and restoration as may be required to accomplish their part of the work.

**3.4 PAINTING**

- A. Any painting to match adjacent or surrounding areas.

**3.5 LEVELING OF FLOORS**

- A. Contractor shall submit for approval - brand of latex, floor leveler to

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be used. Leveler shall include additive for waterproofing.

**3.6 PATCHING**

- A. Contractor shall be responsible for all patching required as a result of installation of new work.
- B. Contractor shall furnish all related components, trims, etc. required to complete the work.

- - -END- - -

## VAMC HINES ROOM LISTING BUILDING 200

RANK	FUNCTION	% ASB	TYPE ASB	QTY	FRI	COND	POT FOR DIST	OCC CODE	OSI SAMPLE COMMENTS	REEVALUATION:	FRI	COND	POT FOR DIST	COMMENT	
<hr/>															
** AREA CRAWL SPACE															
* ROOM A															
	NSINS								NSINS					NO CHANGE	
	NSWM								NSWM					NO CHANGE	
	NSFM								NSFM					NO CHANGE	
6	PIPE F-CC	18	CHR		HIGH	GOOD	MOD	MNT	97751-X	LP STM RET	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-ST	0			HIGH	GOOD	MOD	MNT	97752-X	HP STM FITG	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-CC	15	CHR		HIGH	GOOD	MOD	MNT	97753-X	HP STM RET	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-ST	0			HIGH	GOOD	MOD	MNT	97757-X	STM FITG	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-CC	0			HIGH	GOOD	MOD	MNT	97758-X	STM RET	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-ST	15	CHR		HIGH	GOOD	MOD	MNT	97762-X	HP STM	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-DC	15	CHR	10	LF	HIGH	GOOD	MOD	MNT	97765-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DC	15	CHR	10	LF	HIGH	GOOD	MOD	MNT	97766-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-SH	15	CHR	10	LF	HIGH	GOOD	MOD	MNT	97767-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DH	15	CHR	16	LF	HIGH	GOOD	MOD	MNT	97768-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE
* ROOM B															
	NSCM								NSCM					NO CHANGE	
	NSFM								NSFM					NO CHANGE	
	NSINS								NSINS					NO CHANGE	
	NSWM								NSWM					NO CHANGE	
6	PIPE F-CC	18	CHR		HIGH	GOOD	MOD	MNT	97751-X	LP STM RET	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-ST	0			HIGH	GOOD	MOD	MNT	97752-X	HP STM FITG	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-CC	15	CHR	15	LF	HIGH	GOOD	MOD	MNT	97753-X	HP STM RET	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DH	15	CHR		HIGH	GOOD	MOD	MNT	97755-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-DC	0			HIGH	GOOD	MOD	MNT	97756-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-ST	0			HIGH	GOOD	MOD	MNT	97757-X	STM FITG	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-CC	0			HIGH	GOOD	MOD	MNT	97758-X	STM RET	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-ST	15	CHR	10	LF	HIGH	GOOD	MOD	MNT	97762-X	HP STM	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DC	15	CHR		HIGH	GOOD	MOD	MNT	97765-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-DC	15	CHR	10	LF	HIGH	GOOD	MOD	MNT	97766-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DH	15	CHR	20	LF	HIGH	GOOD	MOD	MNT	97767-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DH	15	CHR	20	LF	HIGH	GOOD	MOD	MNT	97768-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE
* ROOM C															
	NSCM								NSCM					NO CHANGE	
	NSWM								NSWM					NO CHANGE	
	NSFM								NSFM					NO CHANGE	
	NSINS								NSINS					NO CHANGE	
6	PIPE F-CC	18	CHR	13	LF	HIGH	GOOD	MOD	MNT	97751-X	LP STM RET	HIGH	GOOD	MOD	NO CHANGE
	PIPE F-ST	0	10	LF	HIGH	GOOD	MOD	MNT	97752-X	HP STM FITG	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-CC	15	CHR	20	LF	HIGH	GOOD	MOD	MNT	97753-X	HP STM RET	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DC	15	CHR	15	LF	HIGH	GOOD	MOD	MNT	97754-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DH	15	CHR	30	LF	HIGH	GOOD	MOD	MNT	97755-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE
	PIPE F-DC	0	10	LF	HIGH	GOOD	MOD	MNT	97756-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-ST	0	10	LF	HIGH	GOOD	MOD	MNT	97757-X	STM FITG	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-CC	0	10	LF	HIGH	GOOD	MOD	MNT	97758-X	STM RET	HIGH	GOOD	MOD	NO CHANGE	
	DEBRIS	0	64	SF	HIGH	POOR	HIGH	MNT	97759-X	DEBRIS	HIGH	POOR	HIGH	NO CHANGE	
6	PIPE-CON	85	CHR	10	LF	MOD	GOOD	MOD	MNT	97761-X	STM RET AIR CELL	MOD	GOOD	MOD	NO CHANGE
6	PIPE F-ST	15	CHR		HIGH	GOOD	MOD	MNT	97762-X	HP STM	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE-CON	50	AM	25	LF	HIGH	GOOD	MOD	MNT	97763-X	HP RET MINERAL	HIGH	GOOD	MOD	NO CHANGE
	OTHR	0	500	SF	NON	GOOD	HIGH	EMP	97764-X	CONVEYOR BELT	NON	GOOD	HIGH	NO CHANGE	
6	PIPE F-DC	15	CHR		HIGH	GOOD	MOD	MNT	97765-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-DC	15	CHR	15	LF	HIGH	GOOD	MOD	MNT	97766-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DH	15	CHR		HIGH	GOOD	MOD	MNT	97767-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-DH	15	CHR	10	LF	HIGH	GOOD	MOD	MNT	97768-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE
* ROOM D															
	NSCM								NSCM					NO CHANGE	
	NSWM								NSWM					NO CHANGE	
	NSINS								NSINS					NO CHANGE	
	NSFM								NSFM					NO CHANGE	
6	PIPE F-CC	18	CHR		HIGH	GOOD	MOD	MNT	97751-X	LP STM RET	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-ST	0			HIGH	GOOD	MOD	MNT	97752-X	HP STM FITG	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-CC	15	CHR	35	LF	HIGH	GOOD	MOD	MNT	97753-X	HP STM RET	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DC	15	CHR		HIGH	GOOD	MOD	MNT	97754-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-DH	15	CHR	30	LF	HIGH	GOOD	MOD	MNT	97755-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE
	PIPE F-DC	0	30	LF	HIGH	GOOD	MOD	MNT	97756-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-ST	0			HIGH	GOOD	MOD	MNT	97757-X	STM FITG	HIGH	GOOD	MOD	NO CHANGE	
	PIPE F-CC	0			HIGH	GOOD	MOD	MNT	97758-X	STM RET	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-DC	15	CHR		HIGH	GOOD	MOD	MNT	97765-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-DC	15	CHR		HIGH	GOOD	MOD	MNT	97766-X	CW FITG	HIGH	GOOD	MOD	NO CHANGE	
6	PIPE F-DH	15	CHR	10	LF	HIGH	GOOD	MOD	MNT	97767-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE
6	PIPE F-DH	15	CHR	10	LF	HIGH	GOOD	MOD	MNT	97768-X	HW FITG	HIGH	GOOD	MOD	NO CHANGE
* ROOM ELV															
	OTHR	0	70	SF	NON	GOOD	LOW	MNT	97760-X	CANVAS WALL COVER	NON	GOOD	LOW	NO CHANGE	

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
AREA BASEMENT										
ROOM A001										
	PLAS-W	0	N/A	1264 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	52 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	52 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	1140 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	1140 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
ROOM A001A										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	448 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
7	VFT	8	CHR	196 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	196 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
ROOM A001B										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	304 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
7	VFT	8	CHR	84 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	84 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
ROOM A001C										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
ROOM A001D										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
ROOM A001F										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	N/A	N/A	N/A	Y	GOOD	MOD	NO CHANGE
7	VFT	8	CHR	120 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	120 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
ROOM A002										
	PLAS-W	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NO CHANGE
	ACT	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NO CHANGE
	MSTC	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NO CHANGE
	BSBRD	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
7	VFT	8	CHR	192 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	192 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM A003</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	MSTC	0	N/A	320 SF	97923-X	MSTC FOR 97923 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	PLAS-A	0	N/A	352 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	352 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
<b>ROOM A004</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	352 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	352 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	352 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
<b>ROOM A005</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	512 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	512 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	512 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM A006</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	352 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	352 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	352 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM A008</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	GOOD	LOW	NO CHANGE
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	GOOD	LOW	NO CHANGE
	ACT	0	N/A	90 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	90 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	90 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM A009</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	420 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	420 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE



## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	MSTC	0	N/A	420 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM A010</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	VFT	0	N/A	289 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	289 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM A011</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	512 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	512 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	300 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
<b>ROOM A012</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	391 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	391 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	391 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
<b>ROOM A013</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
<b>ROOM A014</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	ACT	0	N/A	90 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	90 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	90 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
<b>ROOM A015</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	352 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	352 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	352 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM A016</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	ACT	0	N/A	90 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	90 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	90 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM A017</b>										
	PLAS-A	0	N/A	88 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	304 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	88 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	80 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
<b>ROOM A018</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	378 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	378 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	378 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM A020</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-W	0	N/A	240 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM A021</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
<b>ROOM A022</b>										
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
5	WALL-BRD	0	N/A	1600 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	100 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	2500 SF	98270-X	2'X4' MIXED WRM & DOT, WHT	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	2500 SF	98271-X	1'X1' TAN,GRY,WHT, SML MOT	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	2500 SF	98271-X	MSTC FOR 98271 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM A022A</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	PLAS-A	0	N/A	2700 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM A022B</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	208 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM A023</b>										
	MSTC	0	N/A	22 SF	97924-X	MSTC FOR 98268 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	544 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	22 SF	98268-X	4" TAN BSBRD	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	285 SF	98270-X	2'X4' MIXED WRM & DOT, WHT	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	285 SF	98271-X	MSTC FOR 98271 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	285 SF	98271-	1'X1' TAN,GRY,WHT, SML MOT	N	GOOD	LOW	NO CHANGE
	OTHR	0	N/A	20 SF	98272-	SPRAY ON PNEUMATIC TUBE	N	GOOD	LOW	NO CHANGE
<b>ROOM A023A</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	MSTC	0	N/A	18 SF	97924-X	MSTC FOR 98268 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	448 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	18 SF	98268-X	41' TAN BSBRD	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	195 SF	98270-X	2'X4' MIXED WRM & DOT, WHT	Y	GOOD	LOW	NO CHANGE
<b>ROOM A023B</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	LP STM RET	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	N/A	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	17 SF	97924-X	MSTC FOR 98268 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	676 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	17 SF	98268-	4" TAN BSBRD	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	169 SF	98270-	2'X4' MIXED WRM & DOT, WHT	Y	GOOD	LOW	NO CHANGE
<b>ROOM A023C</b>										
	WALL-BRD	0	N/A	688 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	43 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	28 SF	98269-X	MSTC FOR 98269 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	420 SF	98270-X	2'X4' MIXED WRM & DOT, WHT	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	420 SF	98271-X	1'X1' TAN,GRY,WHT, SML MOT	N	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	MSTC	0	N/A	420 SF	98271-X	MSTC FOR 98271 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	28 SF	98269-	4" WHT BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM A023D</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	192 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	36 SF	98270-X	2'X4' MIXED WRM & DOT, WHT	Y	GOOD	LOW	NO CHANGE
<b>ROOM A024</b>										
5	PLAS-W	3	CHR	10 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	21 SF	97924-X	MSTC FOR 97924 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	512 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	240 SF	98270-X	2'X4' MIXED WRM & DOT, WHT	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	240 SF	98273-	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	240 SF	98274-	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
<b>ROOM A024A</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	121 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM A024B</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	121 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM A024C</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
<b>ROOM A025</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	64 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM A025B</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	N/A	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
7	PIPE F-DCW	N/A	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
<b>ROOM A027</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	C	GOOD	LOW	NO CHANGE
7	PIPE F-DHW	N/A	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	N/A	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	WALL-BRD	0	N/A	576 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	36 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	576 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	24 SF	98269-X	4" WHT BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	24 SF	98269-X	MSTC FOR 98269 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	275 SF	98270-X	2'X4' MIXED WRM & DOT, WHT	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	275 SF	98271-X	MSTC FOR 98271 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	275 SF	98271-X	1'X1' TAN,GRY,WHT, SML MOT	N	GOOD	LOW	NO CHANGE
<b>ROOM A029</b>										
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	60 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	272 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	11 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	11 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	60 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	60 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM B002</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	LP STM RET	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
<b>ROOM B003</b>										
	WALL-BRD	0	N/A	576 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	36 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	320 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	BSBRD	0	N/A	24 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	24 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	352 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	320 SF	97923-	1'X1' WHT W/BRN FLKS	N	GOOD	LOW	NO CHANGE
<b>ROOM B004</b>										
6	PIPE F-DCW	15	CHR	10 LF	97754-X	CW FITG				NO CHANGE
<b>ROOM B005</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
5	PLAS-W	3	CHR	15 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	352 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	120 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	120 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	120 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B006</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
6	PIPE F-CON	3	CHR	N/A	97916-X	COND FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	720 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	23 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	10 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	208 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM B006A</b>										
	WALL-BRD	0	N/A	720 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	10 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
<b>ROOM B007</b>										
	PLAS-A	0	N/A	48 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	224 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	N/A	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	N/A	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
7	VFT	8	CHR	48 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	48 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM 8007D</b>										
	ACT	0	N/A	280 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM B008</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	320 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	28 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	28 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	320 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	320 SF	98275-	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	20 SF	98277-	MSTC ON WALL	N	GOOD	LOW	NO CHANGE
<b>ROOM B008A</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	126 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	126 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	126 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM B009</b>										
	WALL-BRD	0	N/A	592 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	37 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	592 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	300 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	21 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	21 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	240 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	240 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B010</b>										
	MSTC	0	N/A	33 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM B010A</b>										
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
<b>ROOM B010G</b>										
	NSFM					NSFM	N/A	N/A	N/A	NO CHANGE
<b>ROOM B011</b>										
	WALL-BRD	0	N/A	592 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	37 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	300 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	24 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	24 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	24 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	512 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	300 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B012</b>										
	WALL-BRD	0	N/A	480 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	30 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
<b>ROOM B012</b>										
	ACT	0	N/A	200 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	200 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	200 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B102</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	WALL-BRD	0	N/A	480 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	30 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	200 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	23 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	23 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	200 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
<b>ROOM B104</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE



## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
6	PIPE F-DCW	15	CHR	N/A	97756-X	CW FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	800 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	50 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	33 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	33 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	625 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	625 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B104A</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	112 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM B105</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
5	PLAS-W	3	CHR	15 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
<b>ROOM B106</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	400 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	10 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
<b>ROOM B016B</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	960 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	40 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	40 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM B016C</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	368 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	23 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	15 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	15 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM B016D</b>										

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	656 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	41 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	116 SF	97922-X	MSTC FOR 97922 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	27 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	27 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	116 SF	97922-	6" BLK BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM B017</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	300 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	20 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	1360 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	56 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	56 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B018</b>										
5	PLAS-W	3	CHR	21 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	42 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	110 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	14 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	14 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B019</b>										
5	PLAS-W	3	CHR	20 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	320 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	100 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	14 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	14 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B020</b>										

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	320 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	N/A	N/A	N/A	N/A	WALL-BRD MUD	N/A	N/A	N/A	ABATED
	PLAS-W	0	N/A	320 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	N/A	N/A	N/A	N/A	2'X4' WHT W/HOZ WRM, DOTS	N/A	N/A	N/A	ABATED
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B021</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	400 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	25 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	400 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	150 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	17 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	17 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B022</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0		N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	3	CHR	N/A	97916-X	COND FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	448 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	28 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	12 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	12 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
7	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B023</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	150 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	400 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	MSTC	0	N/A	17 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	17 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98275 LAB RESULTS	N/A	N/A	N/A	ABATED
	VFT	N/A	N/A	N/A	N/A	9"X9" BLK & GRN SWIRL	N/A	N/A	N/A	ABATED
<b>ROOM B024</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	400 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	21 SF	97924-X	4" BRN BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B025</b>										
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	560 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	276 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	23 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	23 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	276 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	276 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B026</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	320 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	100 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	100 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B027</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	320 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	20 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	100 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
7	MSTC	30	CHR	100 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B028</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	320 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	20 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	100 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	100 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B029</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	320 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	20 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	100 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	100 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B030</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-W	N/A	N/A	208 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM B031</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
7	ACT	30	CHR	1600 SF	97918-	2'X2' GEO HOLE	Y	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
<b>ROOM B032</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	N/A	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	N/A	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-W	N/A	N/A	320 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-A	N/A	N/A	60 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM B033</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
<b>ROOM B034</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	1400 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM B035A</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	576 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	30 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	30 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	272 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	272 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B035B</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0		N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97756-X	CW FITG				NO CHANGE
	WALL-BRD	0	N/A	464 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	29 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	20 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	20 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
7	VFT	8	CHR	204 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	204 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B036</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	1280 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	53 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	53 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B036A</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	320 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B036B</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	464 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	10 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B036C</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	464 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B307</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97765-X	CW FITG	Y	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	WALL-BRD	0	N/A	1280 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	80 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	53 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	53 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	1500 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	1500 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B038</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	1200 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	75 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	49 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	49 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B038A</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	288 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	18 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	12 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	12 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B038B</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	288 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	18 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	12 SF	98265-X"	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	12 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	N/A	N/A	N/A	N/A	9"X9" TAN W/BRN & WHT STRKS	N/A	N/A	N/A	ABATED
	MSTC	N/A	N/A	N/A	N/A	MSTC FOR 98278	N/A	N/A	N/A	ABATED
<b>ROOM B039</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	1200 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	75 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE



## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	BSBRD	0	N/A	50 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	50 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	1450 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	1450 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B040</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	N/A	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97756-X	CW FITG	Y	GOOD	LOW	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97757-X	STM FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	960 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	60 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	960 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	875 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	40 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	40 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	875 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	875 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B040A</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	72 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	288 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	12 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	12 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	72 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	72 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM B040B</b>										
	PLAS-W	0	N/A	352 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	120 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	15 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	15 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	120 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	120 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
<b>ROOM B040C</b>										
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-W	0	N/A	336 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	108 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	14 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	14 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	108 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	108 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM 8041</b>										
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	464 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	29 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	208 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	20 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	20 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	208 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	208 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM C002</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG				NO CHANGE
<b>ROOM C003</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
<b>ROOM 0003A</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
<b>ROOM C004</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
<b>ROOM C005</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	368 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	23 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	110 SF	98264-X	MSTC FOR 98264 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	110 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	15 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	15 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	132 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM C006</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	368 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	24 SF	97924-X	4" BRN BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	15 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	132 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	132 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM 0007</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	368 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	23 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	15 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	15 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	132 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	132 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM 0008</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
	PLAS-A	0	N/A	28 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	176 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM 0009</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	512 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
5	PLAS-W	3	CHR	32 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	21 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	21 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	256 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	256 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM C010</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
5	PLAS-W	3	CHR	30 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	512 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	240 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	255 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	255 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	240 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM C011</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	640 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	336 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	336 SF	98264-X	MSTC FOR 98264 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	24 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM C012</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	592 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	37 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	300 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	50 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	50 SF	98264-X	MSTC FOR 98264	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	24 SF	98265-X	MSTC FOR 98265	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	24 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM C012A</b>										
	WALL-BRD	0	N/A	192 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	12 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	36 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	36 SF	98264-X	MSTC FOR 982654	N	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	MSTC	0	N/A	N/A	98265-X	MSTC FOR 98265	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	N/A	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	192 SF	98276-X	1'X1' WHT W/CRATERS WALL TILE	Y	GOOD	LOW	NO CHANGE
	ACT	0	N/A	36 SF	98276-X	1'X1' WHT W/CRATERS	Y	GOOD	LOW	NO CHANGE
<b>ROOM C012B</b>										
	WALL-BRD	0	N/A	320 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	20 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	100 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	100 SF	98264-X	MSTC FOR 98264	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	100 SF	98276-X	1'X1' WHT W/CRATERS	Y	GOOD	LOW	NO CHANGE
	ACT	0	N/A	320 SF	98276-X	1'X1' WHT W/CRATERS WALL TILE	Y	GOOD	LOW	NO CHANGE
<b>ROOM C012C</b>										
	WALL-BRD	0	N/A	192 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	12 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	35 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	35 SF	98264-X	1'X1' TAN W/GRY & BRN ELKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	35 SF	98264-X	MSTC FOR 98264 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	N/A	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	N/A	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM C012D</b>										
	WALL-BRD	0	N/A	272 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	17 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	70 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	70 SF	98264-X	MSTC FOR 98264 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	11 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	11 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	70 SF	98276-X	1'X1' WHT W/CRATERS	Y	GOOD	LOW	NO CHANGE
	ACT	0	N/A	272 SF	98276-	1'X1' WHT W/CRATERS WALL TILE	Y	GOOD	LOW	NO CHANGE
<b>ROOM C012E</b>										
	WALL-BRD	0	N/A	272 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	17 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	70 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	70 SF	98264-X	MSTC FOR 98264 LAB RESULTS	N	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	MSTC	0	N/A	11 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	11 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	272 SF	98276-X	1'X1' WHT W/CRATERS WALL TILE	Y	GOOD	LOW	NO CHANGE
	ACT	0	N/A	70 SF	98276-X	1'X1' WHT W/CRATERS	Y	GOOD	LOW	NO CHANGE
<b>ROOM C013</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	576 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	315 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	315 SF	98264-X	MSTC FOR 98264 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM C014</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	880 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	36 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	36 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	750 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	750 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM C015</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-W	0	N/A	256 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	60 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM C016</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	60 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM C017</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	VIB	0	N/A	10 SF	97443-X	VIB CANVAS	N	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

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LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	10 LF	97756-X	CW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97766-X	CW FITG	Y	GOOD	LOW	NO CHANGE
<b>ROOM C018</b>										
	PLAS-W	0	N/A	704 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	29 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	29 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	420 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	420 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM C019</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
5	PIPE F-CHW	25	CHR	25 LF	97772-X	CHILLER	Y	GOOD	LOW	NO CHANGE
6	TANK	70	MIX	700 SF	97769-	TANK INS	Y	GOOD	LOW	NO CHANGE
	FIREPROOF	0	N/A	4000 SF	97770-	FIREPROOF SPRAY ON	Y	GOOD	LOW	NO CHANGE
	PIPE F-CHW	0	N/A	N/A	97771-	CHILL RET LINE	Y	GOOD	LOW	NO CHANGE
5	PIPE F-CHW	25	CHR	10 LF	97772-	CHILLER	Y	GOOD	LOW	NO CHANGE
2	PIPE F-STM	15	CHR	30 LF	97773-	STM LINE TO CHILLER	Y	GOOD	LOW	NO CHANGE
5	PIPE-STM	7	MIX	N/A	97774-	STM	Y	GOOD	LOW	NO CHANGE
<b>ROOM C021</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	200 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM C022</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
<b>ROOM C023</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

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LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
<b>ROOM C023D</b>										
	MSTC	0	N/A	720 SF	98266-X	MSTC FOR 98266 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM C025</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-W	0	N/A	256 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	64 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM C026</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	10F	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
	PIPE F-STM	0	N/A	10F	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	10F	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	3	CHR	10F	97916-	COND FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE-COND	50	MIX	10F	97917-	COND FITG	Y	GOOD	LOW	NO CHANGE
<b>ROOM C027</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	MSTC	0	N/A	252 SF	98263-X	MSTC FOR 98263	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	15 SF	98265-X	MSTC FOR 98265	N	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	528 SF	98261-	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	252 SF	98262-	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	252 SF	98263-	1'X1' WHT W/BRN & GRY MOT	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	15 SF	98265-	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM C027A</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
<b>ROOM C029</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings



## MC Consulting Inc.

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LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
<b>ROOM C032</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	ACT	0	N/A	4800 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM C032A</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	720 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM C032B</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	ACT	0	N/A	2000 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
<b>ROOM C032D</b>										
	PLAS-W	0	N/A	928 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	38 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	38 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	5	CHR	720 SF	98266-	1'X1' WHT THIN BRN STRKS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	720 SF	98267-	2'X4' WHT W/LRG HOZ WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM C032E</b>										
	PLAS-W	0	N/A	624 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	26 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	26 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	VFT	5	CHR	380 SF	98266-X	1'X1' WHT THIN BRN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	380 SF	98266-X	MSTC FOR 98266 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	380 SF	98267-X	2'X4' WHT W/LRG HO2 WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM C032F</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
<b>ROOM C032G</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-W	0	N/A	240 SF	98261-X	PLAS	Y	GOOD	MOD	
7	VFT	5	CHR	380 SF	98266-X	1'X1' WHT THIN BRN STRKS	N	GOOD	LOW	TILE
	MSTC	0	N/A	380 SF	98266-X	MSTC FOR 98266 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM C032I</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	375 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM C032J</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	460 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM C032K</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	108 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
	WALL-BRD	0	N/A	336 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	15 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	21 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
<b>ROOM C032U</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	448 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	28 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	160 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	18 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	18 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM C032Y</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
<b>ROOM C032Z</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
<b>ROOM CAB1</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	N/A	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
5	PLAS-W	3	CHR	20 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	3328 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	1600 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	1600 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	137 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	137 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
7	PLAS-W	2	CHR	N/A	97636-	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
<b>ROOM CAB3</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	ACT	0	N/A	400 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	400 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	400 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
<b>ROOM CAB4</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	ACT	0	N/A	720 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	720 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	720 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM CAB5</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	ACT	0	N/A	800 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	800 SF	98275-X	MSTC FOR 98275 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	800 SF	98275-X	9"X9" BLK & GRN SWIRL	N	GOOD	LOW	NO CHANGE
<b>ROOM CAB6</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0		N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	N/A	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	10 LF	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	2048 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	128 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	960 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	84 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	84 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	960 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	960 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM CBB2</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97765-X	CW FITG	Y	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	600 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	300 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	32 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	32 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	320 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	300 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM C333</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	2048 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	960 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	100 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	100 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	960 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
7	MSTC	30	CHR	960 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM CBB5</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	10 LF	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	10 LF	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	10 LF	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	10 LF	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	10 LF	97765-X	CW FITG	Y	GOOD	LOW	NO CHANGE
	ACT	0	N/A	960 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	320 SF	98264-X	1'X1' TAN W/BRN & GRY FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	320 SF	98264-X	MSTC FOR 98264 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	640 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	640 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	2048 SF	97919-	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	N/A	97920-	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	OTHR	0	N/A	N/A	97921-	WALL-BRD TAPE	N	GOOD	LOW	NO CHANGE
<b>ROOM CBB6</b>										
6	PIPE F-CON	3	CHR	N/A	97916-X	COND FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	320 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	20 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	100 SF	97924-X	MSTC FOR 97924 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	100 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	100 SF	98264-X	1'X1' TAN W/BRN & GRY FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	100 SF	98264-X	MSTC FOR 98264 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	100 SF	97924-	4" BRN BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM CCB1</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	LP STM RET	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97756-X	CW FITG	Y	GOOD	LOW	NO CHANGE
	PLAS-W	0		1392 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM CCB2</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	768 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	48 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	320 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM CCB3</b>										
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	2032 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	840 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	840 SF	98264-X	MSTC FOR-98_264 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	84 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	84 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	840 SF	98264-X	1'X1' TAN W/BRN & GRY FLKS	N	GOOD	LOW	NO CHANGE
<b>ROOM CCB4</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
<b>ROOM CDB1</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	PLAS-W	0	N/A	800 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM CDB2</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	350 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM CDB4</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	928 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	40 SF	97920-X	WALLBOARD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	400 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	400 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	58 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	640 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	1040 SF	98274-X	MSTC FOR 98273 & 98264	N	GOOD	LOW	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	ACT	0	N/A	640 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM CDB5</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	1408 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	88 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	640 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM CDB6</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	N/A	N/A	176 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM 0001</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	80 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	288 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM D002</b>										
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
6	PIPE F-DHW	15	CHR	N/A	97767-X	HW FITG	Y	GOOD	LOW	NO CHANGE
	PLAS-A	0	N/A	80 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	288 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM D003</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	189 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM D004</b>										

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
<b>ROOM D005</b>										
	WALL-BRD	0	N/A	336 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	110 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	14 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	14 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	132 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
<b>ROOM D006</b>										
	MSTC	0	N/A	24 SF	97924-X	MSTC FOR 97294 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	15 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	288 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	288 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	288 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D006A</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	BSBRD	0	N/A	24 SF	97924-X	4" BRN BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	24 SF	97924-X	MSTC FOR 97294 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	288 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	288 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	288 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D007</b>										
	WALL-BRD	0	N/A	304 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	19 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	78 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
<b>ROOM D007</b>										
	MSTC	0	N/A	78 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	78 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D007A</b>										



## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	WALL-BRD	0	N/A	544 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	34 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	22 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	22 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	280 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	280 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	280 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D007B</b>										
	WALL-BRD	0	N/A	256 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	16 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	11 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	11 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	64 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	64 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	64 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D007C</b>										
	WALL-BRD	0	N/A	304 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	19 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	78 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	78 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	78 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D007D</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	544 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	34 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	22 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	22 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	280 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	280 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
<b>ROOM D008</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
<b>ROOM D008</b>										

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	WALL-BRD	0	N/A	1120 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	50 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	46 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	46 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	1200 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D008A</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	240 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	15 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	10 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	10 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	56 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D0083</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	240 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	15 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	10 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	10 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	56 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D008C</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	240 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	15 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	10 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	10 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	56 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D008D</b>										
	NSFM					NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	256 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	16 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	11 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	11 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	63 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D008E</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	WALL-BRD	0	N/A	91 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
	WALL-BRD	0	N/A	272 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	25 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
<b>ROOM D008F</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	91 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
	WALL-BRD	0	N/A	320 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	25 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
<b>ROOM D008J</b>										
	WALL-BRD	0	N/A	400 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	25 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	400 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	17 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	17 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	150 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	150 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	150 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D008K</b>										
	WALL-BRD	0	N/A	320 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	20 SF	97920-X	WALLBOARD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	320 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	100 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	100 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	100 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D008Y</b>										
	PLAS-W	0	N/A	304 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	90 SF	98280-X	MSTC FOR 98280 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	90 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	90 SF	98280-	1'X1' BLU & WHT SWRL	N	GOOD	LOW	NO CHANGE
<b>ROOM D008Z</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0		640 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	26 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	26 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM D008Z</b>										
	ACT	0	N/A	400 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	1100 SF	98281-	1'X1' YEL & GRY SWRL	N	GOOD	LOW	NO CHANGE
7	MSTC	5	CHR	400 SF	98282-	MSTC FOR 98281	N	GOOD	LOW	NO CHANGE
<b>ROOM D009</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
6	PIPE F-DHW	15	CHR	10 LF	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	1280 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	100 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	1600 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	53 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	53 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
7	VFT	8	CHR	1600 SF	98278-X	9"X9" TAN W/BRN & WHT STRKS	N	GOOD	LOW	NO CHANGE
7	MSTC	30	CHR	1600 SF	98279-X	MSTC FOR 98278	N	GOOD	LOW	NO CHANGE
<b>ROOM D009A</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	N/A	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	576 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	25 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	320 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	VFT	0	N/A	320 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	320 SF	98264-X	MSTC FOR 98264 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	24 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	24 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM D009B</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	620 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM D009E</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	50 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM D009F</b>										
	WALL-BRD	0	N/A	352 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	N/A	N/A	25 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	N/A	CHR	120 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
5	VFT	3	N/A	120 SF	98264-X	1'X1' TAN W/GRY & BRN FLKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	120 SF	98264-X	MSTC FOR 98624 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	15 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	15 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
<b>ROOM D009I</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
<b>ROOM D010</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT				NO CHANGE
	WALL-BRD	0	N/A	450 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
	WALL-BRD	0	N/A	656 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	41 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	289 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	33 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	27 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	27 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	330 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D010A</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	WALL-BRD	0	N/A	304 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	19 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	150 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	240 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	33 SF	98265-X	MSTC FOR 98265 LAB RESULT	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	90 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	90 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	90 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D010B</b>										
	WALL-BRD	0	N/A	304 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	19 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	90 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	90 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	90 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D010C</b>										
	WALL-BRD	0	N/A	304 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	19 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	90 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	90 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	90 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D010D</b>										
	WALL-BRD	0	N/A	304 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	19 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	MSTC	0	N/A	13 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	13 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	90 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	90 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	90 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D010E</b>										

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	N/A	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	672 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	42 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	416 SF	98262-X	2'X4' WHT W/HOZ WRM, DOTS	Y	GOOD	LOW	NO CHANGE
	BSBRD	0	N/A	28 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	28 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM D010F</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	300 SF	97919-X	WALLBOARD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	12 SF	97920-X	WALLBOARD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	150 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	VFT	0	N/A	150 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	150 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
<b>ROOM D010G</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	240 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	12 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	N/A	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	N/A	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	36 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D010H</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	736 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	46 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	30 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	30 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	480 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D010I</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
<b>ROOM D010J</b>										
	WALL-BRD	0	N/A	544 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	34 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	22 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	22 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	280 SF	98273-X	1'X1' GRY W/SQUARE PAT	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	280 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	280 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D010L</b>										
	WALL-BRD	0	N/A	640 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	40 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	26 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	26 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	400 SF	98273-X	1'X1' TAN W/BRN,WHT THIN STRKS	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	400 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	400 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D010M</b>										
	WALL-BRD	0	N/A	528 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	33 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	22 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	22 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	200 SF	98273-X	1'X1' GRY W/SQUARE PAT	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	200 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	200 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM DOWN</b>										
	WALL-BRD	0	N/A	688 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	43 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	28 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	28 SF	98265-X	MSTC FOR 98265 LAB RESULT	N	GOOD	LOW	NO CHANGE
	VFT	0	N/A	280 SF	98273-X	1'X1' GRY W/SQUARE PAT	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	280 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	280 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE



## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
<b>ROOM D011</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	592 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	37 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-W	0	N/A	240 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	24 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	24 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
	ACT	0	N/A	312 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D011A</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	624 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	39 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	ACT	0	N/A	360 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D011B</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	WALL-BRD	0	N/A	256 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	16 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	BSBRD	0	N/A	11 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	11 SF	98265-X	MSTC FOR 98265 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM D0118</b>										
	ACT	0	N/A	39 SF	98283-X	2'X4' WHT W/SML WRM & DOTS	Y	GOOD	LOW	NO CHANGE
<b>ROOM D011C</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	PLAS-W	0	N/A	192 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM D011D</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	N/A	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
	PLAS-A	0	N/A	42 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM D011E</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	208 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
5	PLAS-W	3	CHR	13 SF	97920-X	WALL-BRD MUD	Y	GOOD	MOD	NO CHANGE
	PLAS-A	0	N/A	42 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM D013</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	MSTC	0	N/A	200 SF	98274-X	MSTC FOR 98273	N	GOOD	LOW	NO CHANGE
<b>ROOM D014</b>										
6	FIRESTOP	10	CHR	N/A	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
<b>ROOM D015</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
	WALL-BRD	0	N/A	128 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
<b>ROOM D016</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
<b>ROOM D017</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME	Y	N/A	LOW	Presume behind walls & above ceilings
	PLAS-A	0	N/A	170 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
<b>ROOM D018</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
6	FIRESTOP	10	CHR	10 LF	97509-X	FIRESTOP WHT	Y	GOOD	LOW	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	N/A	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	N/A	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	N/A	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CHW	10	CHR	20 LF	97881-X	CHILL FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	3	CHR	10 LF	97916-X	COND FITG	Y	GOOD	LOW	NO CHANGE
	WALL-BRD	0	N/A	336 SF	97919-X	WALL-BRD	Y	GOOD	MOD	NO CHANGE
<b>ROOM D018A</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	N/A	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
<b>ROOM D018B</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
<b>ROOM D019</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
<b>ROOM D021</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE

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## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	PIPE F-STM	0	N/A	10 LF	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
	PIPE F-CON	15	CHR	10 LF	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
	PIPE F-DCW	15	CHR	N/A	97765-X	CW FITG	Y	GOOD	LOW	NO CHANGE
<b>ROOM D022</b>										
	DUCT	N/A	N/A	N/A	N/A	DUCT INS NS	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	HP STM FITG	Y	GOOD	LOW	NO CHANGE
	PIPE F-STM	0	N/A	N/A	97752-X	LP STM RET	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	N/A	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-CON	15	CHR	10 LF	97753-X	COND FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DCW	15	CHR	10 LF	97754-X	CW FITG	Y	GOOD	LOW	NO CHANGE
6	PIPE F-DHW	15	CHR	20 LF	97755-X	HW FITG	Y	GOOD	LOW	NO CHANGE
<b>ROOM D022A</b>										
	NSFM	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSCM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
<b>ROOM D023</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	N/A	N/A	1125 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM D024</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSINS	N/A	N/A	N/A	N/A	NSINS	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
<b>ROOM 0025</b>										
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
7	PIPE F-DHW	15	CHR	N/A	97755-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings
7	PIPE F-DCW	15	CHR	N/A	97765-X	N-ACC ASSUME POSITIVE	Y	N/A	LOW	Presume behind walls & above ceilings

## MC Consulting Inc.

## BLDG 200 BSMT FL

LOCATION		ACM %	TYPE	QTY	SAMPLE	MATERIAL DESCRIPTION	REEVALUATION 2010			COMMENTS
RANK	FUNCTION						FRIABLE	COND	POT FOR	
							Y/N		DIST	
	PLAS-A	0	N/A	525 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM D025A</b>										
	NSCM	N/A	N/A	N/A	N/A	NSCM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
<b>ROOM D025B</b>										
	NSWM	N/A	N/A	N/A	N/A	NSWM	N/A	N/A	N/A	NO CHANGE
	NSFM	N/A	N/A	N/A	N/A	NSFM	N/A	N/A	N/A	NO CHANGE
	PLAS-A	0	N/A	1800 SF	98261-X	PLAS	Y	GOOD	MOD	NO CHANGE
<b>ROOM DAB1</b>										
	MSTC	0	N/A	1600 SF	98264-X	MSTC FOR 98624 LAB RESULTS	N	GOOD	LOW	NO CHANGE
<b>ROOM DDB4</b>										
	BSBRD	0	N/A	58 SF	98265-X	4" BLK BSBRD	N	GOOD	LOW	NO CHANGE

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**SECTION 02 82 11**  
**TRADITIONAL ASBESTOS ABATEMENT**

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**PART 1 - GENERAL**

**1.1 SUMMARY OF THE WORK**

**1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS**

Drawings, general provisions of the contract, including general and supplementary conditions and other Division 01 specifications, shall apply to the work of this section. The contract documents show the work to be done under the contract and related requirements and conditions impacting the project. Related requirements and conditions include applicable codes and regulations, notices and permits, existing site conditions and restrictions on use of the site, requirements for partial owner occupancy during the work, coordination with other work and the phasing of the work. In the event the Asbestos Abatement Contractor discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the Contracting Officer for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor without obtaining guidance from the Contracting Officer shall become the sole risk and responsibility of the Asbestos Abatement Contractor. All costs incurred due to such action are also the responsibility of the Asbestos Abatement Contractor.

**1.1.2 EXTENT OF WORK**

A. Below is a brief description of the estimated quantities of asbestos containing materials to be abated. These quantities are for informational purposes only and are based on the best information available at the time of the specification preparation. The Contractor shall satisfy himself as the actual quantities to be abated. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related documents.

B. Removal, clean-up and disposal of asbestos containing materials (ACM) and asbestos/waste contaminated elements in an appropriate regulated area for the following approximate quantities;

( 25 ) fittings 50 - 150 mm (2" - 6") in diameter - TF5F

( 158 ) square meters (1,700 sf) of drywall & joint compound - MDWC-1

( 80 ) SQUARE METERS (860 SF) OF FLOOR TILE & MASTIC - MF12-1, MF12-2 &

**MF9-11.1.3 RELATED WORK**

A. Section 07 84 00, FIRESTOPPING.

B. Section 02 41 00, DEMOLITION.

C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.

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D. Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.

E. Section 23 21 13, HYDRONIC PIPING

F. Section 23 31 00, HVAC DUCTS AND CASINGS

**1.1.1.4 TASKS**

The work tasks are summarized briefly as follows:

- A. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, regulated area preparations, emergency procedures arrangements, and standard operating procedures for asbestos abatement work.
- B. Abatement activities including removal, clean-up and disposal of ACM waste, recordkeeping, security, monitoring, and inspections.
- C. Cleaning and decontamination activities including final visual inspection, air monitoring and certification of decontamination.

**1.1.1.5 CONTRACTORS USE OF PREMISES**

- A. The Contractor and Contractor's personnel shall cooperate fully with the VA representative/consultant to facilitate efficient use of buildings and areas within buildings. The Contractor shall perform the work in accordance with the VA specifications, drawings, phasing plan and in compliance with any/all applicable Federal, State and Local regulations and requirements.
- B. The Contractor shall use the existing facilities in the building strictly within the limits indicated in contract documents as well as the approved pre-abatement work plan. Asbestos abatement drawings of partially occupied buildings will show the limits of regulated areas; the placement of decontamination facilities; the temporary location of bagged waste ACM; the path of transport to outside the building; and the temporary waste storage area for each building/regulated area. Any variation from the arrangements shown on drawings shall be secured in writing from the VA representative through the pre-abatement plan of action. The following limitations of use shall apply to existing facilities shown on drawings:

Reference Section 028211-A, the asbestos inspection report, "Limited Pre-Renovation Asbestos Inspection Report: Re-Purpose C-Section Basement Pool & Electrical Room Project, VA Project #578-15-026, Edward Hines, JR., Veterans Administration Hospital, Hines, IL", prepared by The Sigma Group, Inc.

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**1.2 VARIATIONS IN QUANTITY**

The quantities and locations of ACM as indicated on the drawings and the extent of work included in this section are estimated which are limited by the physical constraints imposed by occupancy of the buildings. Accordingly, minor variations (+/- 5%) in quantities of ACM within the regulated area are considered as having no impact on contract price and time requirements of this contract. Where additional work is required beyond the above variation, the contractor shall provide unit prices for newly discovered materials and those prices shall be used for additional work required under the contractor.

Additionally, it may be later determined that materials designated as Assumed to Contain (ATC) do not contain greater than one percent asbestos. As such, the contractor shall provide unit pricing for all materials designated as POS and ATC. Materials designated as ATC which are later determined to contain less than one percent asbestos may be removed from the contract at the discretion of the owner. The dollar amount deducted from the contract will be determined by multiplying the quantity of ATC materials determined to be non-ACM by the unit costs.

**1.3 STOP ASBESTOS REMOVAL**

If the Contracting Officer; their field representative; or the VPIH/CIH presents a written **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and maintain HEPA filtered air flow and adequately wet any exposed ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the VA. A stop asbestos removal order may be issued at any time the VA determines abatement conditions/activities are not within specification requirements. Work stoppage will continue until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions will be borne by the Contractor, including the industrial hygienist's time. The occurrence of any of the following events shall be reported immediately by the Contractor's competent person in writing to the VA representative and shall require the Contractor to immediately stop asbestos removal/disturbance activities and initiate fiber reduction activities:

- A.  $\geq 0.01$  f/cc outside a regulated area or  $>0.05$  f/cc inside a regulated area;

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- B. breach/break in regulated area barrier(s);
- C. less than -0.02" WCG pressure in the regulated area;
- D. serious injury/death at the site;
- E. fire/safety emergency at the site;
- F. respiratory protection system failure;
- G. power failure or loss of wetting agent; or
- H. any visible emissions observed outside the regulated area.

#### **1.4 DEFINITIONS**

##### **1.4.1 GENERAL**

Definitions and explanations here are neither complete nor exclusive of all terms used in the contract documents, but are general for the work to the extent they are not stated more explicitly in another element of the contract documents. Drawings must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated therein.

##### **1.4.2 GLOSSARY**

**Abatement** - Procedures to control fiber release from asbestos-containing materials, typically during removal. Includes removal, encapsulation, enclosure, demolition and renovation activities related to asbestos.

**ACE** - Asbestos contaminated elements.

**ACM** - Asbestos containing material.

**Aerosol** - Solid or liquid particulate suspended in air.

**Adequately wet** - Sufficiently mixed or penetrated with liquid to prevent the release of particulates. If visible emissions are observed coming from the ACM, then that material has not been adequately wetted.

**Aggressive method** - Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact ACM.

**Aggressive sampling** - EPA AHERA defined clearance sampling method using air moving equipment such as fans and leaf blowers to aggressively disturb and maintain in the air residual fibers after abatement.

**AHERA** - Asbestos Hazard Emergency Response Act. Asbestos regulations for schools issued in 1987.

**Aircell** - Pipe or duct insulation made of corrugated cardboard which contains asbestos.

**Air monitoring** - The process of measuring the fiber content of a known volume of air collected over a specified period of time. The NIOSH 7400 Method, Issue 2 is used to determine the fiber levels in air.

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**Air sample filter** - The filter used to collect fibers which are then counted. The filter is made of mixed cellulose ester membrane for PCM (Phase Contrast Microscopy) and polycarbonate for TEM (Transmission Electron Microscopy)

**Amended water** - Water to which a surfactant (wetting agent) has been added to increase the penetrating ability of the liquid.

**Asbestos** - Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated or altered. Asbestos also includes PACM, as defined below.

**Asbestos-containing material (ACM)** - Any material containing more than one percent of asbestos.

**Asbestos contaminated elements (ACE)** - Building elements such as ceilings, walls, lights, or ductwork that are contaminated with asbestos.

**Asbestos-containing waste material** - Asbestos-containing material or asbestos contaminated objects requiring disposal.

**Asbestos waste decontamination facility** - A system consisting of drum/bag washing facilities and a temporary storage area for cleaned containers of asbestos waste. Used as the exit for waste and equipment leaving the regulated area. In an emergency, it may be used to evacuate personnel.

**Authorized person** - Any person authorized by the VA, the Contractor, or government agency and required by work duties to be present in regulated areas.

**Authorized visitor** - Any person approved by the VA; the contractor; or any government agency having jurisdiction over the regulated area.

**Barrier** - Any surface that isolates the regulated area and inhibits fiber migration from the regulated area.

**Containment Barrier** - An airtight barrier consisting of walls, floors, and/or ceilings of sealed plastic sheeting which surrounds and seals the outer perimeter of the regulated area.

**Critical Barrier** - The barrier responsible for isolating the regulated area from adjacent spaces, typically constructed of plastic sheeting secured in place at openings such as doors, windows, or any other opening into the regulated area.

**Primary Barrier** - Barriers placed over critical barriers and exposed directly to abatement work.

**Secondary Barrier** - Any additional sheeting used to isolate and provide protection from debris during abatement work.

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**Breathing zone** - The hemisphere forward of the shoulders with a radius of about 150 - 225 mm (6 - 9 inches) from the worker's nose.

**Bridging encapsulant** - An encapsulant that forms a layer on the surface of the ACM.

**Building/facility owner** - The legal entity, including a lessee, which exercises control over management and recordkeeping functions relating to a building and/or facility in which asbestos activities take place.

**Bulk testing** - The collection and analysis of suspect asbestos containing materials.

**Certified Industrial Hygienist (CIH)** - One certified in practice of industrial hygiene by the American Board of Industrial Hygiene. An industrial hygienist Certified in Comprehensive Practice by the American Board of Industrial Hygiene.

**Class I asbestos work** - Activities involving the removal of Thermal System Insulation (TSI) and surfacing ACM and Presumed Asbestos Containing Material (PACM).

**Class II asbestos work** - Activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic.

**Clean room/Changing room** - An uncontaminated room having facilities for the storage of employee's street clothing and uncontaminated materials and equipment.

**Clearance sample** - The final air sample taken after all asbestos work has been done and visually inspected. Performed by the VA's industrial hygiene consultant (VPIH/CIH).

**Closely resemble** - The major workplace conditions which have contributed to the levels of historic asbestos exposure, are no more protective than conditions of the current workplace.

**Competent person** - In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.

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**Contractor's Professional Industrial Hygienist (CPIH)** - The asbestos abatement contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of the PIH.

**Count** - Refers to the fiber count or the average number of fibers greater than five microns in length per cubic centimeter of air.

**Decontamination area/unit** - An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

**Demolition** - The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

**Disposal bag** - Typically 6 mil thick siftproof, dustproof, leaktight container used to package and transport asbestos waste from regulated areas to the approved landfill. Each bag/container must be labeled/marked in accordance with EPA, OSHA and DOT requirements.

**Disturbance** - Activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM or PACM, no greater than the amount that can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or disposal bag which shall not exceed 60 inches in length or width.

**Drum** - A rigid, impermeable container made of cardboard fiber, plastic, or metal which can be sealed in order to be siftproof, dustproof, and leaktight.

**Employee exposure** - The exposure to airborne asbestos that would occur if the employee were not wearing respiratory protection equipment.

**Encapsulant** - A material that surrounds or embeds asbestos fibers in an adhesive matrix and prevents the release of fibers.

**Encapsulation** - Treating ACM with an encapsulant.

**Enclosure** - The construction of an air tight, impermeable, permanent barrier around ACM to control the release of asbestos fibers from the material and also eliminate access to the material.

**Equipment room** - A contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.



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**Fiber** - A particulate form of asbestos, 5 microns or longer, with a length to width ratio of at least 3 to 1.

**Fibers per cubic centimeter (f/cc)** - Abbreviation for fibers per cubic centimeter, used to describe the level of asbestos fibers in air.

**Filter** - Media used in respirators, vacuums, or other machines to remove particulate from air.

**Firestopping** - Material used to close the open parts of a structure in order to prevent a fire from spreading.

**Friable asbestos containing material** - Any material containing more than 1 percent asbestos as determined using the method specified in appendix A, Subpart F, 40 CFR 763, section 1, Polarized Light Microscopy, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

**Glovebag** - Not more than a 60 x 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which materials and tools may be handled.

**High efficiency particulate air (HEPA) filter** - A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 microns or greater in diameter.

**HEPA vacuum** - Vacuum collection equipment equipped with a HEPA filter system capable of collecting and retaining asbestos fibers.

**Homogeneous area** - An area of surfacing, thermal system insulation or miscellaneous ACM that is uniform in color, texture and date of application.

**HVAC** - Heating, Ventilation and Air Conditioning

**Industrial hygienist** - A professional qualified by education, training, and experience to anticipate, recognize, evaluate and develop controls for occupational health hazards. Meets definition requirements of the American Industrial Hygiene Association (AIHA).

**Industrial hygienist technician** - A person working under the direction of an IH or CIH who has special training, experience, certifications and licenses required for the industrial hygiene work assigned.

**Intact** - The ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

**Lockdown** - Applying encapsulant, after a final visual inspection, on all abated surfaces at the conclusion of ACM removal prior to removal of critical barriers.

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**National Emission Standards for Hazardous Air Pollutants (NESHAP)** - EPA's rule to control emissions of asbestos to the environment.

**Negative initial exposure assessment** - A demonstration by the employer which complies with the criteria in 29 CFR 1926.1101 (f)(2)(iii), that employee exposure during an operation is expected to be consistently below the PEL's.

**Negative pressure** - Air pressure which is lower than the surrounding area, created by exhausting air from a sealed regulated area through HEPA equipped filtration units. OSHA requires maintaining -0.02" water column gauge inside the negative pressure enclosure.

**Negative pressure respirator** - A respirator in which the air pressure inside the facepiece is negative during inhalation relative to the air outside the respirator.

**Non-friable ACM** - Material that contains more than 1 percent asbestos but cannot be crumbled, pulverized, or reduced to powder by hand pressure.

**Organic vapor cartridge** - The type of cartridge used on air purifying respirators for organic vapor exposures.

**Outside air** - The air outside buildings and structures, including, but not limited to, the air under a bridge or in an open ferry dock.

**Owner/operator** - Any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

**Penetrating encapsulant** - Encapsulant that is absorbed into the ACM matrix without leaving a surface layer.

**Personal sampling/monitoring** - Representative air samples obtained in the breathing zone of the person using a cassette and battery operated pump to determine asbestos exposure.

**Permissible exposure limit (PEL)** - The level of exposure OSHA allows for an 8 hour time weighted average. For asbestos fibers, the PEL is 0.1 fibers per cc.

**Polarized light microscopy (PLM)** - Light microscopy using dispersion staining techniques and refractive indices to identify and quantify the type(s) of asbestos present in a bulk sample.

**Polyethylene sheeting** - Strong plastic barrier material 4 to 6 mils thick, semi-transparent, sometimes flame retardant in compliance with NFPA 241.

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**Positive/negative fit check** - A method of verifying the fit of a respirator by closing off the filters and breathing in or closing off the exhalation valve and breathing out while detecting leakage of the respirator.

**Presumed ACM (PACM)** - Thermal system insulation, surfacing, and flooring material installed in buildings prior to 1981. If the building owner has actual knowledge, or should have known through the exercise of due diligence that other materials are ACM, they too must be treated as PACM. The designation of PACM may be rebutted pursuant to 29 CFR 1926.1101 (k)(5).

**Professional IH** - An IH who meets the definition requirements of AIHA; meets the definition requirements of OSHA as a "Competent Person" at 29 CFR 1926.1101 (b); has completed two specialized EPA approved courses on management and supervision of asbestos abatement projects; has formal training in respiratory protection and waste disposal; and has a minimum of four projects of similar complexity with this project of which at least three projects serving as the supervisory IH.

**Project designer** - A person who has successfully completed the training requirements for an asbestos abatement project designer as required by 40 CFR 763 Appendix C, Part I; (B)(5).

**Protection factor** - A value assigned by OSHA/NIOSH to indicate the assigned protection a respirator should provide if worn properly. The number indicates the reduction of exposure level from outside to inside the respirator.

**Qualitative fit test (QLFT)** - A fit test using a challenge material that can be sensed by the wearer if leakage in the respirator occurs.

**Quantitative fit test (QNFT)** - A fit test using a challenge material which is quantified outside and inside the respirator thus allowing the determination of the actual fit factor.

**Regulated area** - An area established by the employer to demarcate where Class I, II, III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work may accumulate; and a work area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed the PEL.

**Regulated ACM (RACM)** - Friable ACM; Category I nonfriable ACM that has become friable; Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading or; Category II nonfriable ACM that has a high probability of becoming or has become

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crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of the demolition or renovation operation.

**Removal** - All operations where ACM, PACM and/or RACM is taken out or stripped from structures or substrates, including demolition operations.

**Renovation** - Altering a facility or one or more facility components in any way, including the stripping or removal of asbestos from a facility component which does not involve demolition activity.

**Repair** - Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.

**Shower room** - The portion of the PDF where personnel shower before leaving the regulated area. Also used for bag/drum decontamination in the EDF.

**Standard operating procedures (SOP's)** - Asbestos work procedures required to be submitted by the contractor before work begins.

**Supplied air respirator (SAR)** - A respirator that utilizes an air supply separate from the air in the regulated area.

**Surfacing ACM** - A material containing more than 1 percent asbestos that is sprayed, troweled on or otherwise applied to surfaces for acoustical, fireproofing and other purposes.

**Surfactant** - A chemical added to water to decrease water's surface tension thus making it more penetrating into ACM.

**Thermal system ACM** - A material containing more than 1 percent asbestos applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain.

**Transmission electron microscopy (TEM)** - A microscopy method that can identify and count asbestos fibers.

**VA Industrial Hygienist (VPIH)** - Department of Veterans Affairs Professional Industrial Hygienist.

**VA Certified Industrial Hygienist (VPCIH)** - Department of Veteran's Affairs Professional Certified Industrial Hygienist.

**VA Representative** - The VA official responsible for on-going project work.

**Visible emissions** - Any emissions, which are visually detectable without the aid of instruments, coming from ACM/PACM/RACM or ACM waste material.

**Waste/Equipment decontamination facility (W/EDF)** - The area in which equipment is decontaminated before removal from the regulated area.

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**Waste generator** - Any owner or operator whose act or process produces asbestos-containing waste material.

**Waste shipment record** - The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

**Wet cleaning** - The process of thoroughly eliminating, by wet methods, any asbestos contamination from surfaces or objects.

**1.4.3 REFERENCED STANDARDS ORGANIZATIONS**

The following acronyms or abbreviations as referenced in contract/specification documents are defined to mean the associated names. Names and addresses may be subject to change.

- A. VA Department of Veterans Affairs  
810 Vermont Avenue, NW  
Washington, DC 20420
- B. AIHA American Industrial Hygiene Association  
2700 Prosperity Avenue, Suite 250  
Fairfax, VA 22031  
703-849-8888
- C. ANSI American National Standards Institute  
1430 Broadway  
New York, NY 10018  
212-354-3300
- D. ASTM American Society for Testing and Materials  
1916 Race St.  
Philadelphia, PA 19103  
215-299-5400
- E. CFR Code of Federal Regulations  
Government Printing Office  
Washington, DC 20420
- F. CGA Compressed Gas Association  
1235 Jefferson Davis Highway  
Arlington, VA 22202  
703-979-0900
- G. CS Commercial Standard of the National Institute of Standards and Technology (NIST)  
U. S. Department of Commerce  
Government Printing Office  
Washington, DC 20420

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- H. EPA Environmental Protection Agency  
401 M St., SW  
Washington, DC 20460  
202-382-3949
- I. MIL-STD Military Standards/Standardization Division  
Office of the Assistant Secretary of Defense  
Washington, DC 20420
- J. MSHA Mine Safety and Health Administration  
Respiratory Protection Division  
Ballston Tower #3  
Department of Labor  
Arlington, VA 22203  
703-235-1452
- K. NIST National Institute for Standards and Technology  
U. S. Department of Commerce  
Gaithersburg, MD 20234  
301-921-1000
- L. NEC National Electrical Code (by NFPA)
- M. NEMA National Electrical Manufacturer's Association  
2101 L Street, N.W.  
Washington, DC 20037
- N. NFPA National Fire Protection Association  
1 Batterymarch Park  
P.O. Box 9101  
Quincy, MA 02269-9101  
800-344-3555
- O. NIOSH National Institutes for Occupational Safety and Health  
4676 Columbia Parkway  
Cincinnati, OH 45226  
513-533-8236
- P. OSHA Occupational Safety and Health Administration  
U.S. Department of Labor  
Government Printing Office  
Washington, DC 20402
- Q. UL Underwriters Laboratory  
333 Pfingsten Rd.  
Northbrook, IL 60062  
312-272-8800

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R. USA United States Army  
Army Chemical Corps  
Department of Defense  
Washington, DC 20420

**1.5 APPLICABLE CODES AND REGULATIONS**

**1.5.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS**

- A. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.
- B. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements or with these specifications exist, the most stringent requirement(s) shall be utilized.
- C. Copies of all standards, regulations, codes and other applicable documents, including this specification and those listed in Section 1.5 shall be available at the worksite in the clean change area of the worker decontamination system.

**1.5.2 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITY**

The Asbestos Abatement Contractor (Contractor) shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to any and all aspects of the abatement project. The Contractor is responsible for providing and maintaining training, accreditations, medical exams, medical records, personal protective equipment as required by applicable Federal, State and Local regulations. The Contractor shall hold the VA and VPIH/CIH consultants harmless for any Contractor's failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental requirement on the part of himself, his employees, or his subcontractors. The Contractor will incur all costs of the CPIH, including all sampling/analytical costs to assure compliance with OSHA/EPA/State requirements related to failure to comply with the regulations applicable to the work.

**1.5.3 FEDERAL REQUIREMENTS**

Federal requirements which govern of asbestos abatement include, but are not limited to, the following regulations.

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- A. Occupational Safety and Health Administration (**OSHA**)
  - 1. Title 29 CFR 1926.1101 - Construction Standard for Asbestos
  - 2. Title 29 CFR 1910.132 - Personal Protective Equipment
  - 3. Title 29 CFR 1910.134 - Respiratory Protection
  - 4. Title 29 CFR 1926 - Construction Industry Standards
  - 5. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
  - 6. Title 29 CFR 1910.1200 - Hazard Communication
  - 7. Title 29 CFR 1910.151 - Medical and First Aid
- B. Environmental Protection Agency (**EPA**):
  - 1. 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.
  - 2. 40 CFR 763.80 - Asbestos Hazard Emergency Response Act (AHERA)
- C. Department of Transportation (**DOT**)
  - Title 49 CFR 100 - 185 - Transportation

**1.5.4 STATE REQUIREMENTS**

State requirements that apply to the asbestos abatement work, disposal, clearance, etc., include, but are not limited to, the following:

- A. Illinois Administrative Code Part 228
- B. Illinois Department of Public Health 225 ILCS 207

**1.5.5 STANDARDS**

- A. Standards which govern asbestos abatement activities include, but are not limited to, the following:
  - 1. American National Standards Institute (ANSI) Z9.2-2012 - Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems
  - 2. ANSI Z88.2 - Practices for Respiratory Protection.
  - 3. Underwriters Laboratories (UL) 586-90 - UL Standard for Safety of HEPA Filter Units, 7th Edition.
- B. Standards which govern encapsulation work include, but are not limited to the following:
  - 1. American Society for Testing and Materials (ASTM)
- C. Standards which govern the fire and safety concerns in abatement work include, but are not limited to, the following:
  - 1. National Fire Protection Association (NFPA) 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
  - 2. NFPA 701 - Standard Methods for Fire Tests for Flame Resistant Textiles and Film.



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3. NFPA 101 - Life Safety Code

**1.5.6 EPA GUIDANCE DOCUMENTS**

- A. EPA guidance documents which discuss asbestos abatement work activities are listed below. These documents are made part of this section by reference. EPA publications can be ordered from (800) 424-9065.
- B. Guidance for Controlling ACM in Buildings (Purple Book) EPA 560/5-85-024
- C. Asbestos Waste Management Guidance EPA 530-SW-85-007
- D. A Guide to Respiratory Protection for the Asbestos Abatement Industry EPA-560-OPTS-86-001
- E. Guide to Managing Asbestos in Place (Green Book) TS 799 20T July 1990

**1.5.7 NOTICES**

- A. State and Local agencies: Send written notification as required by state and local regulations including the local fire department prior to beginning any work on ACM as follows:
- B. Copies of notifications shall be submitted to the VA for the facility's records in the same time frame notification is given to EPA, State, and Local authorities.

**1.5.8 PERMITS/LICENSES**

- A. The contractor shall apply for and have all required permits and licenses to perform asbestos abatement work as required by Federal, State, and Local regulations.

**1.5.9 POSTING AND FILING OF REGULATIONS**

- A. Maintain two (2) copies of applicable federal, state, and local regulations. Post one copy of each in the clean room at the regulated area where workers will have daily access to the regulations and keep another copy in the Contractor's office.

**1.5.10 VA RESPONSIBILITIES**

Prior to commencement of work:

- A. Notify occupants adjacent to regulated areas of project dates and requirements for relocation, if needed. Arrangements must be made prior to starting work for relocation of desks, files, equipment and personal possessions to avoid unauthorized access into the regulated area. **Note: Notification of adjacent personnel is required by OSHA in 29 CFR 1926.1101 (k) to prevent unnecessary or unauthorized access to the regulated area.**
- B. Submit to the Contractor results of background air sampling; including location of samples, person who collected the samples, equipment utilized and method of analysis. During abatement, submit to the

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Contractor, results of bulk material analysis and air sampling data collected during the course of the abatement. This information shall not release the Contractor from any responsibility for OSHA compliance.

**1.5.11 SITE SECURITY**

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately notify the VA.
- C. A log book shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area must record their name, affiliation, time in, and time out for each entry.
- D. Access to the regulated area shall be through a single decontamination unit. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside, however, they shall be sealed with poly sheeting and taped until needed.
- E. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect adjacent personnel. A 24 hour security system shall be provided at the entrance to the regulated area to assure that all entrants are logged in/out and that only authorized personnel are allowed entrance.
- F. The Contractor will have the VA's assistance in notifying adjacent personnel of the presence, location and quantity of ACM in the regulated area and enforcement of restricted access by the VA's employees.
- G. The regulated area shall be locked during non-working hours and secured by VA security/police guards.

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**1.5.12 EMERGENCY ACTION PLAN AND ARRANGEMENTS**

- A. An Emergency Action Plan shall be developed by prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a);(b).
- B. Emergency procedures shall be in written form and prominently posted in the clean room and equipment room of the decontamination unit. Everyone, prior to entering the regulated area, must read and sign these procedures to acknowledge understanding of the regulated area layout, location of emergency exits and emergency procedures.
- C. Emergency planning shall include written notification of police, fire, and emergency medical personnel of planned abatement activities; work schedule; layout of regulated area; and access to the regulated area, particularly barriers that may affect response capabilities.
- D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.
- E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
  - 1. For non life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
  - 2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the regulated area, and secure proper medical treatment.
- F. Telephone numbers of any/all emergency response personnel shall be prominently posted in the clean room, along with the location of the nearest telephone.
- G. The Contractor shall provide verification of first aid/CPR training for personnel responsible for providing first aid/CPR. OSHA requires medical assistance within 3-4 minutes of a life-threatening injury/illness. Bloodborne Pathogen training shall also be verified for those personnel required to provide first aid/CPR.
- H. The Emergency Action Plan shall provide for a Contingency Plan in the event that an incident occurs that may require the modification of the

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standard operating procedures during abatement. Such incidents include, but are not limited to, fire; accident; power failure; negative pressure failure; and supplied air system failure. The Contractor shall detail procedures to be followed in the event of an incident assuring that asbestos abatement work is stopped and wetting is continued until correction of the problem.

**1.5.13 PRE-CONSTRUCTION MEETING**

Prior to commencing the work, the Contractor shall meet with the VA Certified Industrial Hygienist (VPCIH) to present and review, as appropriate, the items following this paragraph. The Contractor's Competent Person(s) who will be on-site shall participate in the pre-start meeting. The pre-start meeting is to discuss and determine procedures to be used during the project. At this meeting, the Contractor shall provide:

- A. Proof of Contractor licensing.
- B. Proof the Competent Person(s) is trained and accredited and approved for working in this State. Verification of the experience of the Competent Person(s) shall also be presented.
- C. A list of all workers who will participate in the project, including experience and verification of training and accreditation.
- D. A list of and verification of training for all personnel who have current first-aid/CPR training. A minimum of one person per shift must have adequate training.
- E. Current medical written opinions for all personnel working on-site meeting the requirements of 29 CFR 1926.1101 (m).
- F. Current fit-tests for all personnel wearing respirators on-site meeting the requirements of 29 CFR 1926.1101 (h) and Appendix C.
- G. A copy of the Contractor's Standard Operating Procedures for Asbestos Abatement. In these procedures, the following information must be detailed, specific for this project.
  1. Regulated area preparation procedures;
  2. Notification requirements procedure of Contractor as required in 29 CFR 1926.1101 (d);
  3. Decontamination area set-up/layout and decontamination procedures for employees;
  4. Abatement methods/procedures and equipment to be used;
  5. Personal protective equipment to be used;
- H. At this meeting the Contractor shall provide all submittals as required.

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- I. Procedures for handling, packaging and disposal of asbestos waste.
- J. Emergency Action Plan and Contingency Plan Procedures.

**1.6 PROJECT COORDINATION**

The following are the minimum administrative and supervisory personnel necessary for coordination of the work.

**1.6.1 PERSONNEL**

- A. Administrative and supervisory personnel shall consist of a qualified Competent Person(s) as defined by OSHA in the Construction Standards and the Asbestos Construction Standard; Contractor Professional Industrial Hygienist and Industrial Hygiene Technicians. These employees are the Contractor's representatives responsible for compliance with these specifications and all other applicable requirements.
- B. Non-supervisory personnel shall consist of an adequate number of qualified personnel to meet the schedule requirements of the project. Personnel shall meet required qualifications. Personnel utilized on-site shall be pre-approved by the VA representative. A request for approval shall be submitted for any person to be employed during the project giving the person's name; qualifications; accreditation card with color picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.
- C. Minimum qualifications for Contractor and assigned personnel are:
  - 1. The Contractor has conducted within the last three (3) years, three (3) projects of similar complexity and dollar value as this project; has not been cited and penalized for serious violations of asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; has adequate materials, equipment and supplies to perform the work.
  - 2. The Competent Person has four (4) years of abatement experience of which two (2) years were as the Competent Person on the project; meets the OSHA definition of a Competent Person; has been the Competent Person on two (2) projects of similar size and complexity as this project; has completed EPA AHERA/OSHA/State/Local training requirements/accreditation(s) and refreshers; and has all required OSHA documentation related to medical and respiratory protection.

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3. The Contractor Professional Industrial Hygienist (CPIH) shall have five (5) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete standard operating procedure for asbestos abatement; has trained abatement personnel for three (3) years; has specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; has completed the NIOSH 582 Course, Contractor/Supervisor course; and has appropriate medical/respiratory protection records/documentation.
4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the standard operating procedures of the Contractor; has one year of asbestos abatement experience; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

**1.7 RESPIRATORY PROTECTION**

**1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM**

The Contractor shall develop and implement a Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998 OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910.132;134. ANSI Standard Z88.2-1992 provides excellent guidance for developing a respiratory protection program. All respirators used must be NIOSH approved for asbestos abatement activities. The written respiratory protection shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c)(1)(i - ix) - Respiratory Protection Program.

**1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR**

The Respiratory Protection Program Coordinator (RPPC) must be identified and shall have two (2) years experience coordinating the program. The RPPC must submit a signed statement attesting to the fact that the program meets the above requirements.

**1.7.3 SELECTION AND USE OF RESPIRATORS**

The procedure for the selection and use of respirators must be submitted to the VA as part of the Contractor's qualification. The procedure must be written clearly enough for workers to understand. A copy of the Respiratory Protection Program must be available in the clean room of the decontamination unit for reference by employees or authorized visitors.

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**1.7.4 MINIMUM RESPIRATORY PROTECTION**

Minimum respiratory protection shall be a full face powered air purifying respirator when fiber levels are maintained consistently at or above 0.5 f/cc. A higher level of respiratory protection may be provided or required, depending on fiber levels. Respirator selection shall meet the requirements of 29 CFR 1926.1101 (h); Table 1, except as indicated in this paragraph. Abatement personnel must have a respirator for their exclusive use.

**1.7.5 MEDICAL WRITTEN OPINION**

No employee shall be allowed to wear a respirator unless a physician has determined they are capable of doing so and has issued a current written opinion for that person.

**1.7.6 RESPIRATOR FIT TEST**

All personnel wearing respirators shall have a current qualitative/quantitative fit test which was conducted in accordance with 29 CFR 1910.134 (f) and Appendix A. Quantitative fit tests shall be done for PAPR's which have been put into a failure mode.

**1.7.7 RESPIRATOR FIT CHECK**

The Competent Person shall assure that the positive/negative fit check is done each time the respirator is donned by an employee. Headcoverings must cover respirator headstraps. Any situation that prevents an effective facepiece to face seal as evidenced by failure of a fit check shall preclude that person from wearing a respirator until resolution of the problem.

**1.7.8 MAINTENANCE AND CARE OF RESPIRATORS**

The Respiratory Protection Program Coordinator shall submit evidence and documentation showing compliance with 29 CFR 1910.134 (h) Maintenance and care of respirators.

**1.7.9 SUPPLIED AIR SYSTEMS**

If a supplied air system is used, the system shall meet all requirements of 29 CFR 1910.134 and the ANSI/Compressed Gas Association (CGA) Commodity Specification for Air current requirements for Type 1 - Grade D breathing air. Low pressure systems are not allowed to be used on asbestos abatement projects. Supplied Air respirator use shall be in accordance with EPA/NIOSH publication EPA-560-OPTS-86-001 "A Guide to Respiratory Protection for the Asbestos Abatement Industry".

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**1.8 WORKER PROTECTION**

**1.8.1 TRAINING OF ABATEMENT PERSONNEL**

Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9) and any additional State/Local requirements. Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site.

**1.8.2 MEDICAL EXAMINATIONS**

Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. A current physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the opinion the person has been evaluated for working in a heat stress environment while wearing personal protective equipment and is able to perform the work.

**1.8.3 PERSONAL PROTECTIVE EQUIPMENT**

Provide whole body clothing, head coverings, gloves and foot coverings and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project. Duct tape shall be used to secure all suit sleeves to wrists and to secure foot coverings at the ankle.

**1.8.4 REGULATED AREA ENTRY PROCEDURE**

The Competent Person shall ensure that each time workers enter the regulated area, they remove ALL street clothes in the clean room of the decontamination unit and put on new disposable coveralls, head coverings, a clean respirator, and then proceed through the shower room to the equipment room where they put on non-disposable required personal protective equipment.

**1.8.5 DECONTAMINATION PROCEDURE - PAPR**

The Competent Person shall require all personnel to adhere to following decontamination procedures whenever they leave the regulated area.



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- A. When exiting the regulated area, remove disposable coveralls, and ALL other clothes, disposable head coverings, and foot coverings or boots in the equipment room.
- B. Still wearing the respirator and completely naked, proceed to the shower. Showering is MANDATORY. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:
  - 1. Thoroughly wet body including hair and face. If using a PAPR hold blower above head to keep filters dry.
  - 2. With respirator still in place, thoroughly decontaminate body, hair, respirator face piece, and all other parts of the respirator except the blower and battery pack on a PAPR. Pay particular attention to cleaning the seal between the face and respirator facepiece and under the respirator straps.
  - 3. Take a deep breath, hold it and/or exhale slowly, completely wetting hair, face, and respirator. While still holding breath, remove the respirator and hold it away from the face before starting to breathe.
- C. Carefully decontaminate the facepiece of the respirator inside and out. If using a PAPR, shut down using the following sequence: a) first cap inlets to filters; b) turn blower off to keep debris collected on the inlet side of the filter from dislodging and contaminating the outside of the unit; c) thoroughly decontaminate blower and hoses; d) carefully decontaminate battery pack with a wet rag being cautious of getting water in the battery pack thus preventing destruction. **(THIS PROCEDURE IS NOT A SUBSTITUTE FOR RESPIRATOR CLEANING!)**.
- D. Shower and wash body completely with soap and water. Rinse thoroughly.
- E. Rinse shower room walls and floor to drain prior to exiting.
- F. Proceed from shower to clean room; dry off and change into street clothes or into new disposable work clothing.

**1.8.6 REGULATED AREA REQUIREMENTS**

The Competent Person shall meet all requirements of 29 CFR 1926.1101 (o) and assure that all requirements for regulated areas at 29 CFR 1926.1101 (e) are met. All personnel in the regulated area shall not be allowed to eat, drink, smoke, chew tobacco or gum, apply cosmetics, or in any way interfere with the fit of their respirator.

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**1.9 DECONTAMINATION FACILITIES**

**1.9.1 DESCRIPTION**

Provide each regulated area with separate personnel (PDF) and waste/equipment decontamination facilities (W/EDF). Ensure that the PDF are the only means of ingress and egress to the regulated area and that all equipment, bagged waste, and other material exit the regulated area only through the W/EDF.

**1.9.2 GENERAL REQUIREMENTS**

All personnel entering or exiting a regulated area must go through the PDF and shall follow the requirements at 29 CFR 1926.1101 (j)(1) and these specifications. All waste, equipment and contaminated materials must exit the regulated area through the W/EDF and be decontaminated in accordance with these specifications. Walls and ceilings of the PDF and W/EDF must be constructed of a minimum of 3 layers of 6 mil opaque fire retardant polyethylene sheeting and be securely attached to existing building components and/or an adequate temporary framework. A minimum of 3 layers of 6 mil poly shall also be used to cover the floor under the PDF and W/EDF units. Construct doors so that they overlap and secure to adjacent surfaces. Weight inner doorway sheets with layers of duct tape so that they close quickly after release. Put arrows on sheets so they show direction of travel and overlap. If the building adjacent area is occupied, construct a solid barrier on the occupied side(s) to protect the sheeting and reduce potential for non-authorized personnel entering the regulated area.

**1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF**

The Competent Person shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention must be provided at the point of connection to the VA system. Water supply must be of adequate pressure and meet requirements of 29 CFR 1910.141(d)(3). Provide adequate temporary overhead electric power with ground fault circuit interruption (GFCI) protection. Provide a sub-panel for all temporary power in the clean room. Provide adequate lighting to provide a minimum of 50 foot candles in the PDF and W/EDF. Provide temporary heat, if needed, to maintain 70°F throughout the PDF and W/EDF.

**1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)**

The Competent Person shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room which is connected to the regulated area. The PDF must be sized to accommodate the number of

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personnel scheduled for the project. The shower room, located in the center of the PDF, shall be fitted with as many portable showers as necessary to insure all employees can complete the entire decontamination procedure within 15 minutes. The PDF shall be constructed of opaque poly for privacy. The PDF shall be constructed to eliminate any parallel routes of egress without showering.

1. Clean Room: The clean room must be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The clean room shall be constructed of at least 3 layers of 6 mil opaque fire retardant poly to provide an air tight room. Provide a minimum of 2 - 900 mm (3 foot) wide 6 mil poly opaque fire retardant doorways. One doorway shall be the entry from outside the PDF and the second doorway shall be to the shower room of the PDF. The floor of the clean room shall be maintained in a clean, dry condition. Shower overflow shall not be allowed into the clean room. Provide 1 storage locker per person. A portable fire extinguisher, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection. Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.
2. Shower Room: The Competent Person shall assure that the shower room is a completely water tight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the equipment room to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using air tight walls made from at least 3 layers of 6 mil opaque fire retardant poly. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap, and shall be maintained in a sanitary

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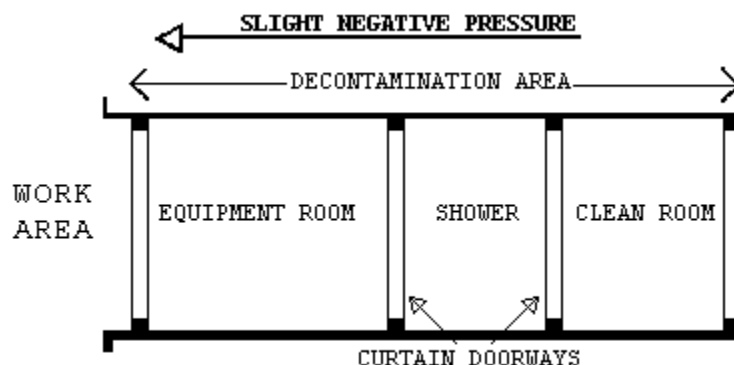
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condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Waste water will be pumped to a drain after being filtered through a minimum of a 100 micron sock in the shower drain; a 20 micron filter; and a final 5 micron filter. Filters will be changed a minimum of daily or more often as needed. Filter changes must be done in the shower to prevent loss of contaminated water. Hose down all shower surfaces after each shift and clean any debris from the shower pan. Residue is to be disposed of as asbestos waste.

3. Equipment Room: The Competent Person shall provide an equipment room which shall be an air tight compartment for the storage of work equipment/tools, reusable personal protective equipment, except for a respirator and for use as a gross decontamination area for personnel exiting the regulated area. The equipment room shall be separated from the regulated area by a minimum 3 foot wide door made with 2 layers of 6 mil opaque fire retardant poly. The equipment room shall be separated from the regulated area, the shower room and the rest of the building by air tight walls and ceiling constructed of a minimum of 3 layers of 6 mil opaque fire retardant poly. Damp wipe all surfaces of the equipment room after each shift change. Provide an additional loose layer of 6 mil fire retardant poly per shift change and remove this layer after each shift. If needed, provide a temporary electrical sub-panel equipped with GFCI in the equipment room to accommodate any equipment required in the regulated area.
4. The PDF shall look like as follows: Clean room at the entrance followed by a shower room followed by an equipment room leading to the regulated area. Each doorway in the PDF is minimum of 2 layers of 6 mil opaque fire retardant poly.

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#### 1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF)

The Competent Person shall provide an W/EDF consisting of a wash room, holding room, and clean room for removal of waste, equipment and contaminated material from the regulated area. Personnel shall not enter or exit the W/EDF except in the event of an emergency. Clean debris and residue in the W/EDF daily. All surfaces in the W/EDF shall be wiped/hosed down after each shift and all debris shall be cleaned from the shower pan. The W/EDF shall consist of the following:

1. Wash Down Station: Provide an enclosed shower unit in the regulated area just outside the Wash Room as an equipment bag and container cleaning station.
2. Wash Room: Provide a wash room for cleaning of bagged or containerized asbestos containing waste materials passed from the regulated area. Construct the wash room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. Locate the wash room so that packaged materials, after being wiped clean, can be passed to the Holding Room. Doorways in the wash room shall be constructed of 2 layers of 6 mil fire retardant poly.
3. Holding Room: Provide a holding room as a drop location for bagged materials passed from the wash room. Construct the holding room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. The holding room shall be located so that bagged material cannot be passed from the wash room to the clean room unless it goes through the holding room. Doorways in the holding room shall be constructed of 2 layers of 6 mil fire retardant poly.
4. Clean Room: Provide a clean room to isolate the holding room from the exterior of the regulated area. Construct the clean room using 2 x 4

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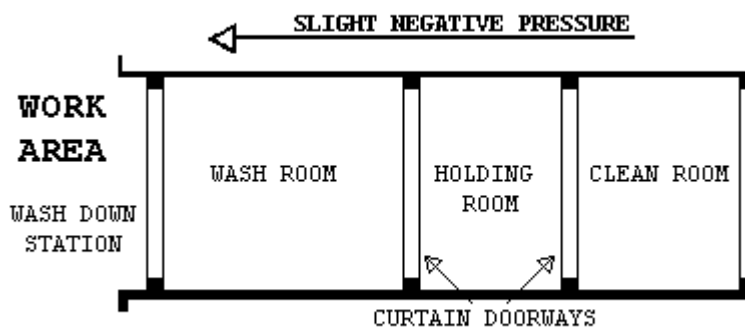
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wood framing and 2 layers of 6 mil fire retardant poly. The clean room shall be located so as to provide access to the holding room from the building exterior. Doorways to the clean room shall be constructed of 2 layers of 6 mil fire retardant poly. When a negative pressure differential system is used, a rigid enclosure separation between the W/EDF clean room and the adjacent areas shall be provided.

5. The W/EDF shall be provided as follows: Wash Room leading to a Holding Room followed by a Clean Room leading to outside the regulated area. See diagram.



**1.9.6 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES**

At washdown station in the regulated area, thoroughly wet clean contaminated equipment and/or sealed polyethylene bags and pass into Wash Room after visual inspection. When passing anything into the Wash Room, close all doorways of the W/EDF, other than the doorway between the washdown station and the Wash Room. Keep all outside personnel clear of the W/EDF. Once inside the Wash Room, wet clean the equipment and/or bags. After cleaning and inspection, pass items into the Holding Room. Close all doorways except the doorway between the Holding Room and the Clean Room. Workers from the Clean Room/Exterior shall enter the Holding Room and remove the decontaminated/cleaned equipment/bags for removal and disposal. These personnel will not be required to wear PPE. At no time shall personnel from the clean side be allowed to enter the Wash Room.

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**PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT**

**2.1 MATERIALS AND EQUIPMENT**

**2.1.1 GENERAL REQUIREMENTS**

Prior to the start of work, the contractor shall provide and maintain a sufficient quantity of materials and equipment to assure continuous and efficient work throughout the duration of the project. Work shall not start unless the following items have been delivered to the site and the CPIH has submitted verification to the VA's representative.

- A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
- B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated area until abatement is completed.
- C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized place.
- D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.
- E. Polyethylene sheeting for walls in the regulated area shall be a minimum of 4-mils. For floors and all other uses, sheeting of at least 6-mils shall be used in widths selected to minimize the frequency of joints. Fire retardant poly shall be used throughout.
- F. The method of attaching polyethylene sheeting shall be agreed upon in advance by the Contractor and the VA and selected to minimize damage to equipment and surfaces. Method of attachment may include any combination of moisture resistant duct tape furring strips, spray glue, staples, nails, screws, lumber and plywood for enclosures or other effective procedures capable of sealing polyethylene to dissimilar finished or unfinished surfaces under both wet and dry conditions.
- G. Polyethylene sheeting utilized for the PDF shall be opaque white or black in color, 6 mil fire retardant poly.
- H. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps and waste water filtration system shall be provided by the Contractor.

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- I. An adequate number of HEPA vacuums, scrapers, sprayers, nylon brushes, brooms, disposable mops, rags, sponges, staple guns, shovels, ladders and scaffolding of suitable height and length as well as meeting OSHA requirements, fall protection devices, water hose to reach all areas in the regulated area, airless spray equipment, and any other tools, materials or equipment required to conduct the abatement project. All electrically operated hand tools, equipment, electric cords shall be connected to GFCI protection.
- J. Special protection for objects in the regulated area shall be detailed (e.g., plywood over carpeting or hardwood floors to prevent damage from scaffolds, water and falling material).
- K. Disposal bags - 2 layers of 6 mil, for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.
- L. The VA shall be provided a copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication. Chlorinated compounds shall not be used with any spray adhesive or other product. Appropriate encapsulant(s) shall be provided.
- M. OSHA DANGER demarcation signs, as many and as required by OSHA 29 CFR 1926.1101(k)(7) shall be provided and placed by the Competent Person. All other posters and notices required by Federal and State regulations shall be posted in the Clean Room.
- N. Adequate and appropriate PPE for the project and number of personnel/shifts shall be provided. All personal protective equipment issued must be based on a hazard assessment conducted under 29 CFR 1910.132(d).

**2.1.2 NEGATIVE PRESSURE FILTRATION SYSTEM**

The Contractor shall provide enough HEPA negative air machines to completely exchange the regulated area air volume 4 times per hour. The Competent Person shall determine the number of units needed for the regulated area by dividing the cubic feet in the regulated area by 15 and then dividing that result by the cubic feet per minute (CFM) for each unit to determine the number of units needed to effect 4 air changes per hour. Provide a standby unit in the event of machine failure and/or emergency in an adjacent area.

NIOSH has done extensive studies and has determined that negative air machines typically operate at ~50% efficiency. The contractor shall



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consider this in their determination of number of units needed to provide 4 air changes per hour. The contractor shall use 8 air changes per hour or double the number of machines based on their calculations or submit proof their machines operate at stated capacities at a 2" pressure drop across the filters.

**2.1.1.3 DESIGN AND LAYOUT**

- A. Before start of work submit the design and layout of the regulated area and the negative air machines. The submittal shall indicate the number of, location of and size of negative air machines. The point(s) of exhaust, air flow within the regulated area, anticipated negative pressure differential, and supporting calculations for sizing shall be provided. In addition, submit the following:
  - 1. Method of supplying power to the units and designation/location of the panels.
  - 2. Description of testing method(s) for correct air volume and pressure differential.
  - 3. If auxiliary power supply is to be provided for the negative air machines, provide a schematic diagram of the power supply and manufacturer's data on the generator and switch.

**2.1.1.4 NEGATIVE AIR MACHINES (HEPA UNITS)**

- A. Negative Air Machine Cabinet: The cabinet shall be constructed of steel or other durable material capable of withstanding potential damage from rough handling and transportation. The width of the cabinet shall be less than 30" in order to fit in standard doorways. The cabinet must be factory sealed to prevent asbestos fibers from being released during use, transport, or maintenance. Any access to and replacement of filters shall be from the inlet end. The unit must be on casters or wheels.
- B. Negative Air Machine Fan: The rating capacity of the fan must indicate the CFM under actual operating conditions. Manufacturer's typically use "free-air" (no resistance) conditions when rating fans. The fan must be a centrifugal type fan.
- C. Negative Air Machine Final Filter: The final filter shall be a HEPA filter. The filter media must be completely sealed on all edges within a structurally rigid frame. The filter shall align with a continuous flexible gasket material in the negative air machine housing to form an air tight seal. Each HEPA filter shall be certified by the manufacturer to have an efficiency of not less than 99.97% when challenged with 0.3

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µm dioctylphthalate (DOP) particles. Testing shall have been done in accordance with Military Standard MIL-STD-282 and Army Instruction Manual 136-300-175A. Each filter must bear a UL586 label to indicate ability to perform under specified conditions. Each filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.

- D. Negative Air Machine Pre-filters: The pre-filters, which protect the final HEPA filter by removing larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. A first stage pre-filter shall be a low efficiency type for particles 10 µm or larger. A second stage pre-filter shall have a medium efficiency effective for particles down to 5 µm or larger. Pre-filters shall be installed either on or in the intake opening of the NAM and the second stage filter must be held in place with a special housing or clamps.
- E. Negative Air Machine Instrumentation: Each unit must be equipped with a gauge to measure the pressure drop across the filters and to indicate when filters have become loaded and need to be changed. A table indicating the cfm for various pressure readings on the gauge shall be affixed near the gauge for reference or the reading shall indicate at what point the filters shall be changed, noting cfm delivery. The unit must have an elapsed time meter to show total hours of operation.
- F. Negative Air Machine Safety and Warning Devices: An electrical/mechanical lockout must be provided to prevent the fan from being operated without a HEPA filter. Units must be equipped with an automatic shutdown device to stop the fan in the event of a rupture in the HEPA filter or blockage in the discharge of the fan. Warning lights are required to indicate normal operation; too high a pressure drop across filters; or too low of a pressure drop across filters.
- G. Negative Air Machine Electrical: All electrical components shall be approved by the National Electrical Manufacturer's Association (NEMA) and Underwriter's Laboratories (UL). Each unit must be provided with overload protection and the motor, fan, fan housing, and cabinet must be grounded.

**2.1.5 PRESSURE DIFFERENTIAL**

The fully operational negative air system within the regulated area shall continuously maintain a pressure differential of -0.02" water column gauge. Before any disturbance of any asbestos material, this

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shall be demonstrated to the VA by use of a pressure differential meter/manometer as required by OSHA 29 CFR 1926.1101(e)(5)(i). The Competent Person shall be responsible for providing, maintaining, and documenting the negative pressure and air changes as required by OSHA and this specification.

**2.1.6 MONITORING**

The pressure differential shall be continuously monitored and recorded between the regulated area and the area outside the regulated area with a monitoring device that incorporates a strip chart recorder. The strip chart recorder shall become part of the project log and shall indicate at least -0.02" water column gauge for the duration of the project.

**2.1.7 AUXILIARY GENERATOR**

If the building is occupied during abatement, provide an auxiliary gasoline/diesel generator located outside the building in an area protected from the weather. In the event of a power failure, the generator must automatically start and supply power to a minimum of 50% of the negative air machines in operation.

**2.1.8 SUPPLEMENTAL MAKE-UP AIR INLETS**

Provide, as needed for proper air flow in the regulated area, in a location approved by the VA, openings in the plastic sheeting to allow outside air to flow into the regulated area. Auxiliary makeup air inlets must be located as far from the negative air machines as possible, off the floor near the ceiling, and away from the barriers that separate the regulated area from the occupied clean areas. Cover the inlets with weighted flaps which will seal in the event of failure of the negative pressure system.

**2.1.9 TESTING THE SYSTEM**

The negative pressure system must be tested before any ACM is disturbed in any way. After the regulated area has been completely prepared, the decontamination units set up, and the negative air machines installed, start the units up one at a time. Demonstrate and document the operation and testing of the negative pressure system to the VA using smoke tubes and a negative pressure gauge. Testing must also be done at the start of each work shift.

**2.1.10 DEMONSTRATION OF THE NEGATIVE AIR PRESSURE SYSTEM**

The demonstration of the operation of the negative pressure system to the VA shall include, but not be limited to, the following:

- A. Plastic barriers and sheeting move lightly in toward the regulated area.

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- B. Curtains of the decontamination units move in toward regulated area.
- C. There is a noticeable movement of air through the decontamination units. Use the smoke tube to demonstrate air movement from the clean room to the shower room to the equipment room to the regulated area.
- D. Use smoke tubes to demonstrate air is moving across all areas in which work is to be done. Use a differential pressure gauge to indicate a negative pressure of at least -0.02" across every barrier separating the regulated area from the rest of the building. Modify the system as necessary to meet the above requirements.

**2.1.11 USE OF SYSTEM DURING ABATEMENT OPERATIONS**

- A. Start units before beginning any disturbance of ACM occurs. After work begins, the units shall run continuously, maintaining 4 actual air changes per hour at a negative pressure differential of -0.02" water column gauge, for the duration of the work until a final visual clearance and final air clearance has been completed. The negative air machines shall not be shut down for the duration of the project unless authorized by the VA, in writing.
- B. Abatement work shall begin at a location farthest from the units and proceed towards them. If an electric failure occurs, the Competent Person shall stop all abatement work and immediately begin wetting all exposed asbestos materials for the duration of the power outage. Abatement work shall not resume until power is restored and all units are operating properly again.
- C. The negative air machines shall continue to run after all work is completed and until a final visual clearance and a final air clearance has been completed for that regulated area.

**2.1.12 DISMANTLING THE SYSTEM**

After completion of the final visual and final air clearance has been obtained by the VPIH/CIH, the units may be shut down. The units shall have been **completely decontaminated**, all pre-filters removed and disposed of as asbestos waste, asbestos labels attached and the units inlet/outlet sealed with 2 layers of 6 mil poly.

**2.1.13 AREAS OUTSIDE CONTAINMENT AREA**

Asbestos contractor is responsible not to disturb areas outside the containment area. Areas surrounding the containment need to be continuously checked to ensure integrity of the containment and that the abatement work does not create any disturbances, damage or openings to the containment.

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**2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA**

**2.2.1 GENERAL**

Seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All surfaces in the regulated area must be covered to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated as a result of the work, shall immediately stop work and clean up the contamination at no additional cost to the VA. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section 2.2.8; FIRESTOPPING.

**2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA**

Place all tools, scaffolding, materials and equipment needed for working in the regulated area prior to erecting any plastic sheeting. All uncontaminated removable furniture, equipment and/or supplies shall be removed by the VA from the regulated area before commencing work. Any objects remaining in the regulated area shall be completely covered with 2 layers of 6-mil fire retardant poly sheeting and secured with duct tape. Lock out and tag out any HVAC/electrical systems in the regulated area.

**2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA**

Access to the regulated area is allowed only through the personnel decontamination facility (PDF). All other means of access shall be eliminated and OSHA DANGER demarcation signs posted as required by OSHA. If the regulated area is adjacent to or within view of an occupied area, provide a visual barrier of 6 mil opaque fire retardant poly to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier must be solid and capable of withstanding the negative pressure.

**2.2.4 CRITICAL BARRIERS**

Completely separate any operations in the regulated area from adjacent areas using 2 layers of 6 mil fire retardant poly and duct tape. Individually seal with 2 layers of 6 mil poly and duct tape all HVAC openings into the regulated area. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other objects/openings in the regulated area. Heat must be shut off any objects covered with poly.

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**2.2.5 PRIMARY BARRIERS**

- A. Cover the regulated area with two layers of 6 mil fire retardant poly on the floors and two layers of 4 mil fire retardant poly on the walls, unless otherwise directed in writing by the VA representative. Floor layers must form a right angle with the wall and turn up the wall at least 300 mm (12"). Seams must overlap at least 1800 mm (6') and must be spray glued and taped. Install sheeting so that layers can be removed independently from each other. Carpeting shall be covered with three layers of 6 mil poly. Corrugated cardboard sheets must be placed between the bottom and middle layers of poly. Mechanically support and seal with duct tape and glue all wall layers.
- B. If stairs and ramps are covered with 6 mil plastic, two layers must be used. Provide 19 mm (3/4") exterior grade plywood treads held in place with duct tape/glue on the plastic. Do not cover rungs or rails with any isolation materials.

**2.2.6 SECONDARY BARRIERS**

A loose layer of 6 mil shall be used as a drop cloth to protect the primary layers from debris generated during the abatement. This layer shall be replaced as needed during the work minimally once per work day.

**2.2.7 EXTENSION OF THE REGULATED AREA**

If the enclosure of the regulated area is breached in any way that could allow contamination to occur, the affected area shall be included in the regulated area and constructed as per this section. Decontamination measures must be started immediately and continue until air monitoring indicates background levels are met.

**2.2.8 FIRESTOPPING**

- A. Through penetrations caused by cables, cable trays, pipes, sleeves must be firestopped with a fire-rated firestop system providing an air tight seal.
- B. Firestop materials that are not equal to the wall or ceiling penetrated shall be brought to the attention of the VA Representative. The contractor shall list all areas of penetration, the type of sealant used, and whether or not the location is fire rated. Any discovery of penetrations during abatement shall be brought to the attention of the VA representative immediately. All walls, floors and ceilings are considered fire rated unless otherwise determined by the VA Representative or Fire Marshall.

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- C. Any visible openings whether or not caused by a penetration shall be reported by the Contractor to the VA Representative for a sealant system determination. Firestops shall meet ASTM E814 and UL 1479 requirements for the opening size, penetrant, and fire rating needed.

**2.3 MONITORING, INSPECTION AND TESTING**

**2.3.1 GENERAL**

- A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. The CPIH shall be responsible for and shall inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.
- B. The VA will employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH will perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors will not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services will be borne by the VA except for any repeat of final inspection and testing that may be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.
- C. If fibers counted by the VPIH/CIH during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed the specified respective limits, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. Request must be in writing and submitted

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to the VA's representative. Cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis will be the responsibility of the CPIH with review and approval of the VPIH/CIH. An agreement between the CPIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

**2.3.2 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT**

- A. The purpose of the work of the VPIH/CIH is to: assure quality; adherence to the specification; resolve problems; prevent the spread of contamination beyond the regulated area; and assure clearance at the end of the project. In addition, their work includes performing the final inspection and testing to determine whether the regulated area or building has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:
1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
  2. Task 2: Perform continuous air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect any faults in the regulated area isolation and any adverse impact on the surroundings from regulated area activities.
  3. Task 3: Perform unannounced visits to spot check overall compliance of work with contract/specifications. These visits may include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.
  4. Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of conflicts, interpret data, etc.
  5. Task 5: Perform, in the presence of the VA representative, final inspection and testing of a decontaminated regulated area at the conclusion of the abatement to certify compliance with all regulations and VA requirements/specifications.



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6. Task 6: Issue certificate of decontamination for each regulated area and project report.
- B. All documentation, inspection results and testing results generated by the VPIH/CIH will be available to the Contractor for information and consideration. The Contractor shall cooperate with and support the VPIH/CIH for efficient and smooth performance of their work.
- C. The monitoring and inspection results of the VPIH/CIH will be used by the VA to issue any Stop Removal orders to the Contractor during abatement work and to accept or reject a regulated area or building as decontaminated.

**2.3.3 MONITORING, INSPECTION AND TESTING BY CONTRACTOR CPIH**

The Contractor's CPIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor's personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor/Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in air sampling and analysis. The IH Technician shall have a NIOSH 582 Course or equivalent and show proof. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA/State Contractor/Supervisor and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation. The analytical laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT. The IH Technician shall maintain a daily log documenting all OSHA requirements for air monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH. The log will contain, at a minimum, information on personnel or area sampled, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc.

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The CPIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH responsibilities.

**2.4 STANDARD OPERATING PROCEDURES**

The Contractor shall have established Standard Operating Procedures (SOP's) in printed form and loose leaf folder consisting of simplified text, diagrams, sketches, and pictures that establish and explain clearly the procedures to be followed during all phases of the work by the Contractor's personnel. The SOP's must be modified as needed to address specific requirements of this project and the specifications. The SOP's shall be submitted for review and approval prior to the start of any abatement work. The minimum topics and areas to be covered by the SOP's are:

- A. Minimum Personnel Qualifications
- B. Emergency Action Plan/Contingency Plans and Arrangements
- C. Security and Safety Procedures
- D. Respiratory Protection/Personal Protective Equipment Program and Training
- E. Medical Surveillance Program and Recordkeeping
- F. Regulated Area Requirements - Containment Barriers/Isolation of Regulated Area
- G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
- H. Negative Pressure Systems Requirements
- I. Monitoring, Inspections, and Testing
- J. Removal Procedures for ACM
- K. Removal of Contaminated Soil (if applicable)
- L. Encapsulation Procedures for ACM
- M. Disposal of ACM waste/equipment
- N. Regulated Area Decontamination/Clean-up
- O. Regulated Area Visual and Air Clearance
- P. Project Completion/Closeout

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**2.5 SUBMITTALS**

**2.5.1 PRE-START MEETING SUBMITTALS**

Submit to the VA a minimum of 14 days prior to the pre-start meeting the following for review and approval. Meeting this requirement is a prerequisite for the pre-start meeting for this project. The submittal shall be organized such that the required information is provided in order as listed below. Each section shall include a separate title page referencing the pre-start meeting submittal section.

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
- C. Submit Standard Operating Procedures developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH.
- D. Submit the specifics of the materials and equipment to be used for this project with brand names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
  - 1. Supplied air system, if used, negative air machines, HEPA vacuums, air monitoring pumps, calibration devices, pressure differential monitoring device and emergency power generating system.
  - 2. Waste water filtration system, shower system, containment barriers.
  - 3. Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, fire extinguishers.
  - 4. Respirators, protective clothing, personal protective equipment.
  - 5. Fire safety equipment to be used in the regulated area.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.

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- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
  - 1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project: Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; Completion Date
  - 2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years: Project Name; Reason; Date; Reference Name/Number; Resolution
  - 3. List asbestos regulatory citations, penalties, damages paid and legal actions taken against the company in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
  - 1. CPIH: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of SOP's developed; medical opinion; current respirator fit test.
  - 2. Competent Person(s)/Supervisor(s): Number; names; years of abatement experience as Competent Person/Supervisor; list of similar projects as Competent Person/Supervisor; as a worker; certificates, licenses,

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accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion; current respirator fit test.

3. Workers: Numbers; names; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion; current respirator fit test.
- J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain English the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of SOP's incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who does and how is air monitoring conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and standard operating procedures; copies of monitoring results of the five referenced projects listed and analytical method(s) used.
- K. Rented equipment must be decontaminated prior to returning to the rental agency.
- L. Submit, before the start of work, the manufacturer's technical data for all types of encapsulants and the MSDS. Provide application instructions also.

**2.5.2 SUBMITTALS DURING ABATEMENT**

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWA's/EL's. Submit this information daily to the VPIH/CIH.
- B. The CPIH shall document and maintain the inspection and approval of the regulated area preparation prior to start of work and daily during work.
  1. Removal of any poly barriers.
  2. Visual inspection/testing by the CPIH prior to application of lockdown.
  3. Packaging and removal of ACM waste from regulated area.

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4. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the VA's representative on a weekly basis.

**2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT**

The CPIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. The report shall include a certificate of completion, signed and dated by the CPIH, in accordance with Attachment #1. All clearance and perimeter samples must be submitted. The VA Representative will retain the abatement report after completion of the project.

**2.6 ENCAPSULANTS**

**2.6.1 TYPES OF ENCAPSULANTS**

- A. The following four types of encapsulants, if used, must comply with performance requirements as stated in paragraph 2.6.2:
  1. Removal encapsulant - used as a wetting agent to remove ACM.
  2. Bridging encapsulant - provides a tough, durable coating on ACM.
  3. Penetrating encapsulant - penetrates/encapsulates ACM at least 13 mm (1/2").
  4. Lockdown encapsulant - seals microscopic fibers on surfaces after ACM removal.

**2.6.2 PERFORMANCE REQUIREMENTS**

Encapsulants shall meet the latest requirements of EPA; shall not contain toxic or hazardous substances; or solvents; and shall comply with the following performance requirements:

- A. General Requirements for all Encapsulants:
  1. ASTM E84: Flame spread of 25; smoke emission of 50.
  2. University of Pittsburgh Protocol: Combustion Toxicity; zero mortality.
  3. ASTM C732: Accelerated Aging Test; Life Expectancy - 20 years.
  4. ASTM E96: Permeability - minimum of 0.4 perms.
- B. Bridging/Penetrating Encapsulants:
  1. ASTM E736: Cohesion/Adhesion Test - 24 kPa (50 lbs/ft<sup>2</sup>).
  2. ASTM E119: Fire Resistance - 3 hours (Classified by UL for use on fibrous/cementitious fireproofing).
  3. ASTM D2794: Gardner Impact Test; Impact Resistance - minimum 11.5 kg-mm (43 in/lb).
  4. ASTM D522: Mandrel Bend Test; Flexibility - no rupture or cracking.

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**C. Lockdown Encapsulants:**

1. ASTM E119: Fire resistance - 3 hours (tested with fireproofing over encapsulant applied directly to steel member).
2. ASTM E736: Bond Strength - 48 kPa (100 lbs/ft<sup>2</sup>) (test compatibility with cementitious and fibrous fireproofing).
3. In certain situations, encapsulants may have to be applied to hot pipes/equipment. The encapsulant must be able to withstand high temperatures without cracking or off-gassing any noxious vapors during application.

**2.6.3 CERTIFICATES OF COMPLIANCE**

The Contractor shall submit to the VA representative certification from the manufacturer indicating compliance with performance requirements for encapsulants when applied according to manufacturer recommendations.

**PART 3 - EXECUTION**

**3.1 PRE-ABATEMENT ACTIVITIES**

**3.1.1 PRE-ABATEMENT MEETING**

The VA representative, upon receipt, review, and substantial approval of all pre-abatement submittals and verification by the CPIH that all materials and equipment required for the project are on the site, will arrange for a pre-abatement meeting between the Contractor, the CPIH, Competent Person(s), the VA representative(s), and the VPIH/CIH. The purpose of the meeting is to discuss any aspect of the submittals needing clarification or amplification and to discuss any aspect of the project execution and the sequence of the operation. The Contractor shall be prepared to provide any supplemental information/documentation to the VA's representative regarding any submittals, documentation, materials or equipment. Upon satisfactory resolution of any outstanding issues, the VA's representative will issue a written order to proceed to the Contractor. No abatement work of any kind described in the following provisions shall be initiated prior to the VA written order to proceed.

**3.1.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS**

Before any work begins on the construction of the regulated area, the Contractor will:

- A. Conduct a space-by-space inspection with an authorized VA representative and prepare a written inventory of all existing damage in those spaces where asbestos abatement will occur. Still or video photography may be

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used to supplement the written damage inventory. Document will be signed and certified as accurate by both parties.

- B. The VA Representative, the Contractor, and the VPIH/CIH must be aware of 10/95 A/E Quality Alert indicating the failure to identify asbestos in the areas listed. Make sure these areas are looked at/reviewed on the project: Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside chases/walls; transite piping/ductwork/sheets; behind radiators; roofing materials; below window sills; water/sewer lines; electrical conduit coverings; crawl spaces (previous abatement contamination); flooring/mastic covered by carpeting/new flooring; exterior insulated wall panels; on underground fuel tanks; steam line trench coverings.
- C. Clean and remove or properly protect from contamination all furniture, machinery, equipment, curtains, drapes, blinds, and other movable objects required to be removed from the regulated area.
- D. If present and required, remove and dispose of carpeting from floors in the regulated area.
- E. Inspect existing firestopping in the regulated area. Correct as needed.

**3.1.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS**

- A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
- B. Upon completion of all preparatory work, the CPIH will inspect the work and systems and will notify the VA's representative when the work is completed in accordance with this specification. The VA's representative may inspect the regulated area and the systems with the VPIH/CIH and may require that upon satisfactory inspection, the Contractor's employees perform all major aspects of the approved SOP's, especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation. The operational systems for respiratory protection and the negative pressure system shall be demonstrated for proper performance.
- C. The CPIH shall document the pre-abatement activities described above and deliver a copy to the VA's representative.
- D. Upon satisfactory inspection of the installation of and operation of systems the VA's representative will notify the Contractor in writing to proceed with the asbestos abatement work in accordance with this specification and all applicable regulations.



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**3.2 REGULATED AREA PREPARATIONS**

- A. Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.
- B. Shut down and lock out electric power to the regulated area. Provide temporary power and lighting. Insure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code requirements and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.
- C. Shut down and lock out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area. Investigate the regulated area and agree on pre-abatement condition with the VA's representative. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6-mil polyethylene disposal bags for staging and eventual disposal as asbestos waste.
- D. The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.
- E. The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to the shower(s) shall be supplied with backflow prevention.
- F. Pre-clean all movable objects within the regulated area using a HEPA filtered vacuum and/or wet cleaning methods as appropriate. After cleaning, these objects shall be removed from the regulated area and carefully stored in an uncontaminated location. Drapes, clothing, upholstered furniture and other fabric items should be disposed of as asbestos contaminated waste. Cleaning these asbestos contaminated items utilizing HEPA vacuum techniques and off-premises steam cleaning is very difficult and cannot guarantee decontamination. Since adequate cleaning of contaminated fabrics is difficult, the VA will determine whether this

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option is an appropriate one. Carpeting will be disposed of prior to abatement if in the regulated area.

- G. Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention must be paid to machinery behind grills or gratings where access may be difficult but contamination may be significant. Also, pay particular attention to wall, floor and ceiling penetration behind fixed items. After precleaning, enclose fixed objects with 2 layers of 6-mil poly and seal securely in place with duct tape. Objects (e.g., permanent fixtures, shelves, electronic equipment, laboratory tables, sprinklers, alarm systems, closed circuit TV equipment and computer cables) which must remain in the regulated area and that require special ventilation or enclosure requirements should be designated here along with specified means of protection. Contact the manufacturer for special protection requirements.
- H. Pre-clean all surfaces in the regulated area using HEPA filtered vacuums and/or wet cleaning methods as appropriate. Do not use any methods that would raise dust such as dry sweeping or vacuuming with equipment not equipped with HEPA filters. Do not disturb asbestos-containing materials during this pre-cleaning phase.

**3.3 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA GENERAL:**

Follow requirements of Section 2.2 - Containment Barriers and Coverings. Asbestos contractor may not disturb areas outside the containment area. The containment barriers and coverings shall be constructed and maintained in such a manner as to prevent disturbances, damage, or openings in the containment. The containment barriers and coverings shall be inspected on an ongoing basis to ensure the integrity of the containment barriers.

**3.4 REMOVAL OF ACM**

**3.4.1 WETTING ACM**

- A. Use amended water for the wetting of ACM prior to removal. The Competent Person shall assure the wetting of ACM meets the definition of "adequately wet" in the EPA NESHAP's regulation and OSHA's "wet methods" for the duration of the project. A removal encapsulant may be used instead of amended water with written approval of the VA's representative.
- B. Amended Water: Provide water to which a surfactant has been added shall be used to wet the ACM and reduce the potential for fiber release during

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disturbance of ACM. The mixture must be equal to or greater than the wetting provided by water amended by a surfactant consisting one ounce of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with 5 gallons (19L) of water.

- C. Removal Encapsulant: Provide a penetrating encapsulant designed specifically for the removal of ACM. The material must, when used, result in adequate wetting of the ACM and retard fiber release during removal.

**3.4.2 SECONDARY BARRIER AND WALKWAYS**

- A. Install as a drop cloth a 6 mil poly sheet at the beginning of each work shift where removal is to be done during that shift. Completely cover floors and any walls within 10 feet (3M) of the area where work is to be done. Secure the secondary barrier with duct tape to prevent debris from getting behind it. Remove the secondary barrier at the end of the shift or as work in the area is completed. Keep residue on the secondary barrier wetted. When removing, fold inward to prevent spillage and place in a disposal bag.
- B. Install walkways using 6 mil black poly between the regulated area and the decontamination facilities (PDF and W/EDF) to protect the primary layers from contamination and damage. Install the walkways at the beginning of each shift and remove at the end of each shift.

**3.4.3 WET REMOVAL OF ACM**

- A. Adequately and thoroughly wet the ACM to be removed prior to removal to reduce/prevent fiber release to the air. Adequate time must be allowed for the amended water to saturate the ACM. Abatement personnel must not disturb dry ACM. Use a fine spray of amended water or removal encapsulant. Saturate the material sufficiently to wet to the substrate without causing excessive dripping. The material must be sprayed repeatedly/continuously during the removal process in order to maintain adequately wet conditions. Removal encapsulants must be applied in accordance with the manufacturer's written instructions. Perforate or carefully separate, using wet methods, an outer covering that is painted or jacketed in order to allow penetration and wetting of the material. Where necessary, carefully remove covering while wetting to minimize fiber release. **In no event shall dry removal occur except in the case of electrical hazards or a greater safety issue is possible!**
- B. If ACM does not wet well with amended water due to coating or jacketing, remove as follows:

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1. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
2. Remove saturated ACM in small sections. Do not allow material to dry out. As material is removed, bag material while still wet into disposal bags. Twist tightly the bag neck, bend over (gooseneck) and seal with a minimum of three tight wraps of duct tape. Clean /decontaminate the outside of any residue and move to washdown station adjacent to W/EDF.
3. Fireproofing or Architectural Finish on Scratch Coat: Spray with a fine mist of amended water or removal encapsulant. Allow time for saturation to the substrate. Do not oversaturate causing excess dripping. Scrape material from substrate. Remove material in manageable quantities and control falling to staging or floor. If the falling distance is over 20 feet (6M), use a drop chute to contain material through descent. Remove residue remaining on the scratch coat after scraping is done using a stiff bristle hand brush. If a removal encapsulant is used, remove residue completely before the encapsulant dries. Re-wet the substrate as needed to prevent drying before the residue is removed.
4. Fireproofing or Architectural Finish on Wire Lath: Spray with a fine mist of amended water or removal encapsulant. Allow time to completely saturate the material. Do not oversaturate causing excess dripping. If the surface has been painted or otherwise coated, cut small holes as needed and apply amended water or removal encapsulant from above. Cut saturated wire lath into 2' x 6' (50mm x 150mm) sections and cut hanger wires. Roll up complete with ACM, cover in burlap and hand place in disposal bag. Do not drop to floor. After removal of lath/ACM, remove any overspray on decking and structure using stiff bristle nylon brushes. Depending on hardness of overspray, scrapers may be needed for removal.
5. Pipe/Tank/Vessel/Boiler Insulation: Remove the outer layer of wrap while spraying with amended water in order to saturate the ACM. Spray ACM with a fine mist of amended water or removal encapsulant. Allow time to saturate the material to the substrate. Cut bands holding pre-formed pipe insulation sections. Slit jacketing at the seams, remove and hand place in a disposal bag. Do not allow dropping to the floor. Remove molded fitting insulation/mud in large pieces and hand place in a disposal bag. Remove any residue on pipe or fitting with a

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stiff bristle nylon brush. In locations where pipe fitting insulation is removed from fibrous glass or other non-asbestos insulated straight runs of pipe, remove fibrous material at least 6" from the point it contacts the ACM.

**3.4.4 WET REMOVAL OF AMOSITE**

- A. Amosite-containing material will require local exhaust ventilation and collection as described below, in addition to wet removal. Amosite-containing materials were not identified in the materials designated as containing greater than one percent asbestos. However, it is possible that amosite is present in materials designated as assumed to contain (ATC) greater than one percent asbestos or which have not been identified and evaluated for asbestos. Any material determined to contain amosite either during the initial asbestos inspection or subsequent inspections shall comply with the following requirements.
- B. Provide local exhaust ventilation and collection systems to assure collection of amosite fibers at the point of generation. A 300 mm (12") flexible rigid non-collapsing duct shall be located no more than 600 mm (2') from any scraping/brushing activity. Primary filters must be replaced every 30 minutes on the negative air machines. Each scraping/brushing activity must have a negative air machine devoted to it. For pre-molded pipe insulation or cutting wire lathe attach a 1200 mm (4') square flared end piece on the intake of the duct. Support the duct horizontally at a point 600 mm (2') below the work to effect capture. One person in the crew shall be assigned to operate the duct collection system on a continual basis.
- C. Amosite does not wet well with amended water. Submit full information/documentation on the wetting agent proposed prior to start for review and approval by the VA Representative. Insure that the material is worked on in small sections and is thoroughly and continuously wetted. Package as soon as possible while wet. Remove as required.

**3.4.5 DISCOVERED MATERIALS**

During abatement, demolition, and/or further inspection, a potential exists for encountering materials not previously identified to become revealed. Upon discovery of a material not previously identified, the contractor shall immediately notify the owner who will arrange for and coordinate materials sample collection and analysis if necessary. The

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contractor is not permitted to collect any material samples for asbestos or other hazardous material analysis.

**3.5 LOCKDOWN ENCAPSULATION**

**3.5.1 GENERAL**

Lockdown encapsulation is an integral part of the ACM removal. At the conclusion of ACM removal and before removal of the primary barriers, all surfaces shall be encapsulated with a bridging encapsulant.

**3.5.2 DELIVERY AND STORAGE**

Deliver materials to the job site in original, new and unopened containers bearing the manufacturer's name and label as well as the following information: name of material, manufacturer's stock number, date of manufacture, thinning instructions, application instructions and the MSDS for the material.

**3.5.3 WORKER PROTECTION**

Before beginning work with any material for which an MSDS has been submitted, provide workers with any required personal protective equipment. The required personal protective equipment shall be used whenever exposure to the material might occur. In addition to OSHA/specification requirements for respiratory protection, a paint pre-filter and an organic vapor cartridge, at a minimum, shall be used in addition to the HEPA filter when a solvent based encapsulant is used. The CPIH shall be responsible for provision of adequate respiratory protection.

**3.5.4 ENCAPSULATION OF SCRATCH COAT PLASTER OR PIPING**

- A. Apply two coats of encapsulant to the scratch coat plaster or piping after all ACM has been removed. Apply in strict accordance with the manufacturer's instructions. Any deviation from the instructions must be approved by the VA's representative in writing prior to commencing the work.
- B. Apply the encapsulant with an airless sprayer at a pressure and using a nozzle orifice as recommended by the manufacturer. Apply the first coat while the scratch coat is still damp from the asbestos removal process, after passing the visual inspection. If the surface has been allowed to dry, wet wipe or HEPA vacuum prior to spraying with encapsulant. Apply a second coat over the first coat in strict conformance with the manufacturer's instructions. Color the encapsulant and contrast the color in the second coat so that visual confirmation of completeness and uniform coverage of each coat is possible. Adhere to

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the manufacturer's instructions for coloring. At the completion of the encapsulation, the surface must be a uniform third color produced by the mixture.

**3.5.5 SEALING EXPOSED EDGES**

Seal edges of ACM exposed by removal work which is inaccessible, such as a sleeve, wall penetration, etc., with two coats of encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the encapsulant. Apply in accordance with 3.5.4 (B).

**3.6 DISPOSAL OF ACM WASTE MATERIALS**

**3.6.1 GENERAL**

Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA and DOT. The landfill requirements for packaging must also be met. Disposal shall be done at an approved landfill. Disposal of non-friable ACM shall be done in accordance with applicable regulations.

**3.6.2 PROCEDURES**

- A. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures in this specification. Waste shall be double-bagged prior to disposal. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall securely sealed to prevent accidental opening and/or leakage. The top shall be tightly twisted and goosenecked prior to tightly sealing with at least three wraps of duct tape. Ensure that unauthorized persons do not have access to the waste material once it is outside the regulated area. All transport containers must be covered at all times when not in use. NESHAP's signs must be on containers during loading and unloading. Material shall not be transported in open vehicles. If drums are used for packaging, the drums shall be labeled properly and shall not be re-used.
- B. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second bag.
- C. Asbestos waste with sharp edged components, i.e., nails, screws, lath, strapping, tin sheeting, jacketing, metal mesh, etc., which might tear poly bags shall be wrapped securely in burlap before packaging and, if needed, use a poly lined fiber drum as the second container, prior to disposal.

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**3.7 PROJECT DECONTAMINATION**

**3.7.1 GENERAL**

- A. The entire work related to project decontamination shall be performed under the close supervision and monitoring of the CPIH.
- B. If the asbestos abatement work is in an area which was contaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal and cleanings of the surfaces of the regulated area after the primary barrier removal.
- C. If the asbestos abatement work is in an area which was uncontaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal, thus preventing contamination of the building when the regulated area critical barriers are removed.

**3.7.2 REGULATED AREA CLEARANCE**

Air testing and other requirements which must be met before release of the Contractor and re-occupancy of the regulated area space are specified in Final Testing Procedures.

**3.7.3 WORK DESCRIPTION**

Decontamination includes the clearance of the air in the regulated area and the decontamination and removal of the enclosures/facilities installed prior to the abatement work including primary/critical barriers, PDF and W/EDF facilities, and negative pressure systems.

**3.7.4 PRE-DECONTAMINATION CONDITIONS**

- A. Before decontamination starts, all ACM waste from the regulated area shall be removed, all waste collected and removed, and the loose 6 mil layer of poly removed and disposed of along with any gross debris generated by the work.
- B. At the start of decontamination, the following shall be in place:
  - 1. Primary barriers consisting of 2 layers of 6 mil poly on the floor and 4 mil poly on the walls.
  - 2. Critical barriers consisting of 2 layers of 6 mil poly which is the sole barrier between the regulated area and openings to the rest of the building or outside.
  - 4. Decontamination facilities for personnel and equipment in operating condition and the negative pressure system in operation.

**3.7.5 FIRST CLEANING**

Carry out a first cleaning of all surfaces of the regulated area including items of remaining poly sheeting, tools, scaffolding,



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ladders/staging by wet methods and/or HEPA vacuuming. Do not use dry dusting/sweeping methods. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible residue from abated surfaces or poly or other surfaces. Remove all filters in the air handling system and dispose of as ACM waste in accordance with these specifications. The negative pressure system shall remain in operation during this time. If determined by the CPIH/VPIH/CIH additional cleaning(s) may be needed.

**3.7.6 PRE-CLEARANCE INSPECTION AND TESTING**

The CPIH and VPIH/CIH will perform a thorough and detailed visual inspection at the end of the cleaning to determine whether there is any visible residue in the regulated area. If the visual inspection is acceptable, the CPIH will perform pre-clearance sampling using aggressive clearance as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). If the sampling results show values below 0.01 f/cc, then the Contractor shall notify the VA's representative of the results with a brief report from the CPIH documenting the inspection and sampling results and a statement verifying that the regulated area is ready for lockdown encapsulation. The VA reserves the right to utilize their own VPIH/CIH to perform a pre-clearance inspection and testing for verification.

**3.7.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES**

With the express written permission of the VA's representative, perform lockdown encapsulation of all surfaces from which asbestos was abated in accordance with the procedures in this specification. Negative pressure shall be maintained in the regulated area during the lockdown application.

**3.8 FINAL VISUAL INSPECTION AND AIR CLEARANCE TESTING**

**3.8.1 GENERAL**

Notify the VA representative 24 hours in advance for the performance of the final visual inspection and testing. The final visual inspection and testing will be performed by the VPIH/CIH starting after the final cleaning.

**3.8.2 FINAL VISUAL INSPECTION**

Final visual inspection will include the entire regulated area, the PDF, all poly sheeting, seals over HVAC openings, doorways, windows, and any other openings. If any debris, residue, dust or any other suspect material is detected, the final cleaning shall be repeated at no cost to

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the VA. Dust/material samples may be collected and analyzed at no cost to the VA at the discretion of the VPIH/CIH to confirm visual findings. When the regulated area is visually clean the final testing can be done.

**3.8.3 FINAL AIR CLEARANCE TESTING**

- A. After an acceptable final visual inspection by the VPIH/CIH and VA Representative AE Project Engineer, the VPIH/CIH will perform the final testing. Air samples will be collected and analyzed in accordance with procedures for AHERA in this specification. If work is less than 260 lf/160 sf, 5 PCM samples may be collected for clearance. If work is equal to or more than 260 lf/160 sf, TEM sampling shall be done for clearance. TEM analysis shall be done in accordance with procedures in this specification. If the release criteria are not met, the Contractor shall repeat the final cleaning and continue decontamination procedures until clearance is achieved. All **additional inspection and testing costs will be borne by the Contractor.**
- B. If release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

**3.8.4 FINAL AIR CLEARANCE PROCEDURES**

- A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc as measured with PCM/TEM methods and as verified by VPIH/CIH. The asbestos containment is to remain in place and under negative pressure until inspected and removal of the containment is authorized by the VPIH/CIH.
- B. Air Monitoring and Final Clearance Sampling: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to the specified level, the VPIH/CIH will secure samples and analyze them according to the following procedures:
  - 1. Fibers Counted: "Fibers" referred to in this section shall be either all fibers regardless of composition as counted in the NIOSH 7400 PCM method or asbestos fibers counted using the AHERA TEM method.
  - 2. Aggressive Sampling: All final air testing samples shall be collected using aggressive sampling techniques except where soil is not encapsulated or enclosed. Samples will be collected on 0.8µ MCE filters for PCM analysis and 0.45µ Polycarbonate filters for TEM. A minimum of 1200 Liters of air shall be collected for clearance samples. Before pumps are started, initiate aggressive sampling as

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detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). Air samples will be collected in areas subject to normal air circulation away from corners, obstructed locations, and locations near windows, doors, or vents. After air sampling pumps have been shut off, circulating fans shall be shut off. The negative pressure system shall continue to operate.

**3.8.5 CLEARANCE SAMPLING USING PCM - LESS THAN 260LF/160SF**

- A. The VPIH/CIH will perform clearance samples as indicated by the specification.
- B. The NIOSH 7400 PCM method will be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 5 PCM clearance samples shall be collected. All samples must be equal to or less than 0.01 f/cc to clear the regulated area.

**3.8.6 CLEARANCE SAMPLING USING TEM - EQUAL TO OR MORE THAN 260LF/160SF**

Clearance requires 13 samples be collected; 5 inside the regulated area; 5 outside the regulated area; and 3 field blanks.

**3.8.7 LABORATORY TESTING OF PCM CLEARANCE SAMPLES**

The services of an AIHA accredited laboratory will be employed by the VA to perform analysis for the air samples. Samples will be sent daily by the VPIH/CIH so that verbal/faxed reports can be received within 24 hours. A complete record, certified by the laboratory, of all air monitoring tests and results will be furnished to the VA's representative and the Contractor.

**3.8.8 LABORATORY TESTING OF TEM SAMPLES**

Samples shall be sent by the VPIH/CIH to an accredited laboratory for analysis by TEM. Verbal/faxed results from the laboratory shall be available within 24 hours after receipt of the samples. A complete record, certified by the laboratory, of all TEM results shall be furnished to the VA's representative and the Contractor.

**3.8.9 AUTHORIZATION TO REMOVE ABATEMENT CONTAINMENT**

Asbestos containment is to remain up and under the required negative pressure until the VA Facility Management and/or the VPIH/CIH inspects and approves of the asbestos abatement work.

**3.9 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE**

**3.9.1 COMPLETION OF ABATEMENT WORK**

After thorough decontamination, seal negative air machines with 2 layers of 6 mil poly and duct tape to form a tight seal at the intake/outlet ends before removal from the regulated area. Complete asbestos abatement

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work upon meeting the regulated area visual and air clearance criteria and fulfilling the following:

- A. Remove all equipment and materials from the project area.
- B. Dispose of all packaged ACM waste as required.
- C. Repair or replace all interior finishes damaged during the abatement work, as required.
- D. Fulfill other project closeout requirements as required in this specification.

**3.9.2 CERTIFICATE OF COMPLETION BY CONTRACTOR**

The CPIH shall complete and sign the "Certificate of Completion" in accordance with Attachment 1 at the completion of the abatement and decontamination of the regulated area.

**3.9.3 WORK SHIFTS**

All work shall be done during administrative hours (8:00 AM to 4:30 PM) Monday -Friday excluding Federal Holidays. Any change in the work schedule must be approved in writing by the VA Representative.

**3.9.4 RE-INSULATION**

Replace all asbestos-containing insulation/fire-proofing with suitable non-asbestos material which is to remain and not be modified by the mechanical contractor. Provide SDS's for all replacement materials. Refer to Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.

**3.9.5 REPLACEMENT OF DIELECTRIC UNIONS**

Replace dielectric unions during the abatement process. Allow for 15% of the dielectric unions to be replaced after demolition and full abatement of the area. Glovebag each fitting and have a plumber on standby to replace any unions.

**ATTACHMENT #1**

**CERTIFICATE OF COMPLETION**

DATE:

PROJECT NAME:

PROJECT ADDRESS:

1. I certify that I have personally inspected, monitored and supervised the abatement work of (specify regulated area or Building):  
which took place from / / / to / /

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2. That throughout the work all applicable requirements/regulations and the VA's specifications were met.
3. That any person who entered the regulated area was protected with the appropriate personal protective equipment and respirator and that they followed the proper entry and exit procedures and the proper operating procedures for the duration of the work.
4. That all employees of the Contractor engaged in this work were trained in respiratory protection, were experienced with abatement work, had proper medical surveillance documentation, were fit-tested for their respirator, and were not exposed at any time during the work to asbestos without the benefit of appropriate respiratory protection.
5. That I performed and supervised all inspection and testing specified and required by applicable regulations and VA specifications.
6. That the conditions inside the regulated area were always maintained in a safe and healthy condition and the maximum fiber count never exceeded 0.5 f/cc, except as described below.
7. That the negative pressure system was installed, operated and maintained in order to provide a minimum of 4 actual air changes per hour with a continuous -0.02" of water column pressure.

Signature/Date:

Signature/Date:

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**ATTACHMENT #2**

**CERTIFICATE OF WORKER'S ACKNOWLEDGMENT**

PROJECT NAME:

DATE:

PROJECT ADDRESS:

ABATEMENT CONTRACTOR'S NAME:

WORKING WITH ASBESTOS CAN BE HAZARDOUS TO YOUR HEALTH. INHALING ASBESTOS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCERS. IF YOU SMOKE AND INHALE ASBESTOS FIBERS YOUR CHANCES OF DEVELOPING LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.

Your employer's contract with the owner for the above project requires that: You must be supplied with the proper personal protective equipment including an adequate respirator and be trained in its use. You must be trained in safe and healthy work practices and in the use of the equipment found at an asbestos abatement project. You must receive/have a current medical examination for working with asbestos. These things shall be provided at no cost to you. By signing this certificate you are indicating to the owner that your employer has met these obligations.

RESPIRATORY PROTECTION: I have been trained in the proper use of respirators and have been informed of the type of respirator to be used on the above indicated project. I have a copy of the written Respiratory Protection Program issued by my employer. I have been provided for my exclusive use, at no cost, with a respirator to be used on the above indicated project.

TRAINING COURSE: I have been trained by a third party, State/EPA accredited trainer in the requirements for an AHERA/OSHA Asbestos Abatement Worker training course, 32 hours minimum duration. I currently have a valid State accreditation certificate. The topics covered in the course include, as a minimum, the following:

Physical Characteristics and Background Information on Asbestos  
Potential Health Effects Related to Exposure to Asbestos  
Employee Personal Protective Equipment  
Establishment of a Respiratory Protection Program  
State of the Art Work Practices  
Personal Hygiene  
Additional Safety Hazards  
Medical Monitoring  
Air Monitoring  
Relevant Federal, State and Local Regulatory Requirements, Procedures,  
and Standards  
Asbestos Waste Disposal

MEDICAL EXAMINATION: I have had a medical examination within the past 12 months which was paid for by my employer. This examination included: health history, occupational history, pulmonary function test, and may have included a chest x-ray evaluation. The physician issued a positive written opinion after the examination.

Signature:

Printed Name:

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Witness:

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**ATTACHMENT #3**

**AFFIDAVIT OF MEDICAL SURVEILLANCE, RESPIRATORY PROTECTION AND  
TRAINING/ACCREDITATION**

VA PROJECT NAME AND NUMBER:

VA MEDICAL FACILITY:

ABATEMENT CONTRACTOR'S NAME AND ADDRESS:

1. I verify that the following individual

Name:

who is proposed to be employed in asbestos abatement work associated with the above project by the named. Contractor, is included in a medical surveillance program in accordance with 29 CFR 1926.1101(m), and that complete records of the medical surveillance program as required by 29 CFR 1926.1101(m)(n) and 29 CFR 1910.20 are kept at the offices of the Contractor at the following address.

Address:

2. I verify that this individual has been trained, fit-tested and instructed in the use of all appropriate respiratory protection systems and that the person is capable of working in safe and healthy manner as expected and required in the expected work environment of this project.
3. I verify that this individual has been trained as required by 29 CFR 1926.1101(k). This individual has also obtained a valid State accreditation certificate. Documentation will be kept on-site.
4. I verify that I meet the minimum qualifications criteria of the VA specifications for a CPIH.

Signature of CPIH:

Date:

Printed Name of CPIH:

Signature of Contractor:

Date:

Printed Name of Contractor:



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ATTACHMENT #4

ABATEMENT CONTRACTOR/COMPETENT PERSON(S) REVIEW AND ACCEPTANCE OF THE  
VA'S ASBESTOS SPECIFICATIONS

VA Project Location:

VA Project #:

VA Project Description:

This form shall be signed by the Asbestos Abatement Contractor Owner and the Asbestos Abatement Contractor's Competent Person(s) prior to any start of work at the VA related to this Specification. If the Asbestos Abatement Contractor's/Competent Person(s) has not signed this form, they shall not be allowed to work on-site.

I, the undersigned, have read VA's Asbestos Specification regarding the asbestos abatement requirements. I understand the requirements of the VA's Asbestos Specification and agree to follow these requirements as well as all required rules and regulations of OSHA/EPA/DOT and State/Local requirements. I have been given ample opportunity to read the VA's Asbestos Specification and have been given an opportunity to ask any questions regarding the content and have received a response related to those questions. I do not have any further questions regarding the content, intent and requirements of the VA's Asbestos Specification.

At the conclusion of the asbestos abatement, I will certify that all asbestos abatement work was done in accordance with the VA's Asbestos Specification and all ACM was removed properly and no fibrous residue remains on any abated surfaces.

Abatement Contractor Owner's Signature Date

Abatement Contractor Competent Person(s) Date

Date

Date

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**SECTION 02 82 13.13**  
**GLOVEBAG ASBESTOS ABATEMENT**

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**PART 1 - GENERAL**

**1.1 SUMMARY OF THE WORK**

**1.1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS**

Drawings, general provisions of the contract, including general and supplementary conditions and other Division 01 specifications, shall apply to the work of this section. The contract documents show the work to be done under the contract and related requirements and conditions impacting the project. Related requirements and conditions include applicable codes and regulations, notices and permits, existing site conditions and restrictions on use of the site, requirements for partial owner occupancy during the work, coordination with other work and the phasing of the work. In the event the Asbestos Abatement Contractor (Contractor) discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the Contracting Officer for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor without obtaining guidance from the Contracting Officer shall become the sole risk and responsibility of the Contractor. All cost incurred due to such action are also the responsibility of the Contractor.

**1.1.2 EXTENT OF WORK**

- A. Below is a brief description of the estimated quantities of asbestos containing materials to be abated by the glovebag method. These quantities are for informational purposes only and are based on the best information available at the time of the specification preparation. The Contractor shall satisfy himself as the actual quantities to be abated. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related documents.
- B. Removal, clean-up and disposal of ACM piping and fittings and asbestos contaminated elements in an appropriate regulated area in the following approximate quantities;
  - ( 25 ) fittings 50 - 150 mm (2" - 6") in diameter - TF5F

**1.1.3 RELATED WORK**

- A. Section 07 84 00, FIRESTOPPING.
- B. Section 02 41 00, DEMOLITION.
- C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION
- D. Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.
- E. Section 23 21 13, HYDRONIC PIPING

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F. Section 23 31 00, HVAC DUCTS AND CASINGS

**1.1.4 TASKS**

The work tasks are summarized briefly as follows:

- A. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, work-site preparations, emergency procedures arrangements, and standard operating procedures for glovebag asbestos abatement work.
- B. Abatement activities including removal, clean-up and disposal of ACM waste, recordkeeping, security, monitoring, and inspections.
- C. Cleaning and decontamination activities including final visual inspection, air monitoring and certification of decontamination.

**1.1.5 ABATEMENT CONTRACTOR USE OF PREMISES**

- A. The Contractor and Contractor's personnel shall cooperate fully with the VA representative/consultant to facilitate efficient use of buildings and areas within buildings. The Contractor shall perform the work in accordance with the VA specifications, drawings, phasing plan and in compliance with any/all applicable Federal, State, and Local regulations and requirements.
- B. The Contractor shall use the existing facilities in the building strictly within the limits indicated in contract documents as well as the approved pre-abatement work plan. Asbestos abatement drawings of partially occupied buildings will show the limits of regulated areas; the placement of decontamination facilities; the temporary location of bagged waste ACM; the path of transport to outside the building; and the temporary waste storage area for each building/regulated area. Any variation from the arrangements shown on drawings shall be secured in writing from the VA representative through the pre-abatement plan of action. The following limitations of use shall apply to existing facilities shown on drawings:

Reference Section 028211-A, the asbestos inspection report, "Limited Pre-Renovation Asbestos Inspection Report: Re-Purpose C-Section Basement Pool & Electrical Room Project, VA Project #578-15-026, Edward Hines, JR., Veterans Administration Hospital, Hines, IL", prepared by The Sigma Group, Inc.

**1.2 VARIATIONS IN QUANTITY**

The quantities and locations of ACM as indicated on the drawings and the extent of work included in this section are estimates which are limited by the physical constraints imposed by occupancy of the buildings.

Accordingly, minor variations (+/- 5%) in quantities of ACM within the



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regulated area are considered as having no impact on contract price and time requirements of this contract. Where additional work is required beyond the above variation, the Contractor shall provide unit prices for additional footage for newly discovered materials and those prices will be used for additional work under the contract.

Additionally, it may be later determined that materials designated as Assumed to Contain (ATC) do not contain greater than one percent asbestos. As such, the contractor shall provide unit pricing for all materials designated as POS and ATC. Materials designated as ATC which are later determined to contain less than one percent asbestos may be removed from the contract at the discretion of the owner. The dollar amount deducted from the contract will be determined by multiplying the quantity of ATC materials determined to be non-ACM by the unit costs.

### **1.3 STOP ASBESTOS REMOVAL**

If the Contracting Officer or their field representative presents a written **Stop Asbestos Removal Order**, the Abatement Contractor/Personnel shall immediately stop all asbestos removal and adequately wet any exposed ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the VA. A stop asbestos removal order may be issued at any time the VA determines abatement conditions/activities are not within specification requirements. Work stoppage will continue until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions will be borne by the Contractor, including the industrial hygienist's time. The occurrence of any of the following events shall be reported immediately by the Contractor in writing to the VA representative and shall require the Contractor to immediately stop asbestos removal activities and initiate fiber reduction activities:

- A.  $\geq 0.01$  f/cc outside a regulated area or  $>0.05$  f/cc inside a regulated area;
- B. breach/break in regulated area critical barrier(s)/floor;
- C. serious injury/death at the site;
- D. fire/safety emergency at the site;
- E. respiratory protection system failure;
- F. power failure or loss of wetting agent; or
- G. any visible emissions observed outside the regulated area.

### **1.4 DEFINITIONS**

#### **1.4.1 GENERAL**

Definitions and explanations here are neither complete nor exclusive of all terms used in the contract documents, but are general for the work

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to the extent they are not stated more explicitly in another element of the contract documents. Drawings must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated therein.

**1.4.2 GLOSSARY**

**Abatement** - Procedures to control fiber release from asbestos-containing materials, typically during removal. Includes removal, encapsulation, enclosure, demolition and renovation activities related to asbestos.

**ACE** - Asbestos contaminated elements.

**ACM** - Asbestos containing material.

**Aerosol** - Solid or liquid particulate suspended in air.

**Adequately wet** - Sufficiently mixed or penetrated with liquid to prevent the release of particulates. If visible emissions are observed coming from the ACM, then that material has not been adequately wetted.

**Aggressive method** - Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact ACM.

**Aggressive sampling** - EPA AHERA defined clearance sampling method using air moving equipment such as fans and leaf blowers to aggressively disturb and maintain in the air residual fibers after abatement.

**AHERA** - Asbestos Hazard Emergency Response Act. Asbestos regulations for schools issued in 1987.

**Aircell** - Pipe or duct insulation made of corrugated cardboard which contains asbestos.

**Air monitoring** - The process of measuring the fiber content of a known volume of air collected over a specified period of time. The NIOSH 7400 Method, Issue 2 is used to determine the fiber levels in air.

**Air sample filter** - The filter used to collect fibers which are then counted. The filter is made of mixed cellulose ester membrane for PCM (Phase Contrast Microscopy) and polycarbonate for TEM (Transmission Electron Microscopy)

**Amended water** - Water to which a surfactant (wetting agent) has been added to increase the penetrating ability of the liquid.

**Asbestos** - Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated or altered. Asbestos also includes PACM, as defined below.

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**Asbestos-containing material (ACM)** - Any material containing more than one percent asbestos.

**Asbestos contaminated elements (ACE)** - Building elements such as ceilings, walls, lights, or ductwork that are contaminated with asbestos.

**Asbestos-containing waste material** - Asbestos-containing material or asbestos contaminated objects requiring disposal.

**Asbestos waste decontamination facility** - A system consisting of drum/bag washing facilities and a temporary storage area for cleaned containers of asbestos waste. Used as the exit for waste and equipment leaving the regulated area. In an emergency, it may be used to evacuate personnel.

**Authorized person** - Any person authorized by the VA, the Contractor, or government agency and required by work duties to be present in regulated areas.

**Authorized visitor** - Any person approved by the VA; the contractor; or any government agency having jurisdiction over the regulated area.

**Barrier** - Any surface that isolates the regulated area and inhibits fiber migration from the regulated area.

**Containment Barrier** - An airtight barrier consisting of walls, floors, and/or ceilings of sealed plastic sheeting which surrounds and seals the outer perimeter of the regulated area.

**Critical Barrier** - The barrier responsible for isolating the regulated area from adjacent spaces, typically constructed of plastic sheeting secured in place at openings such as doors, windows, or any other opening into the regulated area.

**Primary Barrier** - Barriers placed over critical barriers and exposed directly to abatement work.

**Secondary Barrier** - Any additional sheeting used to isolate and provide protection from debris during abatement work.

**Breathing zone** - The hemisphere forward of the shoulders with a radius of about 150 - 225 mm (6 - 9 inches) from the worker's nose.

**Bridging encapsulant** - An encapsulant that forms a layer on the surface of the ACM.

**Building/facility owner** - The legal entity, including a lessee, which exercises control over management and recordkeeping functions relating to a building and/or facility in which asbestos activities take place.

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**Bulk testing** - The collection and analysis of suspect asbestos containing materials.

**Certified Industrial Hygienist (CIH)** - One certified in practice of industrial hygiene by the American Board of Industrial Hygiene. An industrial hygienist Certified in Comprehensive Practice by the American Board of Industrial Hygiene.

**Class I asbestos work** - Activities involving the removal of Thermal System Insulation (TSI) and surfacing ACM and Presumed Asbestos Containing Material (PACM).

**Class II asbestos work** - Activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic.

**Clean room/Changing room** - An uncontaminated room having facilities for the storage of employee's street clothing and uncontaminated materials and equipment.

**Clearance sample** - The final air sample taken after all asbestos work has been done and visually inspected. Performed by the VA's industrial hygiene consultant (VPIH/CIH).

**Closely resemble** - The major workplace conditions which have contributed to the levels of historic asbestos exposure, are no more protective than conditions of the current workplace.

**Competent person** - In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.

**Contractor's Professional Industrial Hygienist (CPIH)** - The Contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of the PIH.

**Count** - Refers to the fiber count or the average number of fibers greater than five microns in length per cubic centimeter of air.

**Decontamination area/unit** - An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room,

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and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

**Demolition** - The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

**Disposal bag** - Typically 6 mil thick siftproof, dustproof, leaktight container used to package and transport asbestos waste from regulated areas to the approved landfill. Each bag/container must be labeled/marked in accordance with EPA, OSHA and DOT requirements.

**Disturbance** - Activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM or PACM, no greater than the amount that can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or disposal bag which shall not exceed 60 inches in length or width.

**Drum** - A rigid, impermeable container made of cardboard fiber, plastic, or metal which can be sealed in order to be siftproof, dustproof, and leaktight.

**Employee exposure** - The exposure to airborne asbestos that would occur if the employee were not wearing respiratory protection equipment.

**Encapsulant** - A material that surrounds or embeds asbestos fibers in an adhesive matrix and prevents the release of fibers.

**Encapsulation** - Treating ACM with an encapsulant.

**Enclosure** - The construction of an air tight, impermeable, permanent barrier around ACM to control the release of asbestos fibers from the material and also eliminate access to the material.

**Equipment room** - A contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

**Fiber** - A particulate form of asbestos, 5 microns or longer, with a length to width ratio of at least 3 to 1.

**Fibers per cubic centimeter (f/cc)** - Abbreviation for fibers per cubic centimeter, used to describe the level of asbestos fibers in air.

**Filter** - Media used in respirators, vacuums, or other machines to remove particulate from air.

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**Firestopping** - Material used to close the open parts of a structure in order to prevent a fire from spreading.

**Friable asbestos containing material** - Any material containing more than 1 percent asbestos as determined using the method specified in appendix A, Subpart F, 40 CFR 763, section 1, Polarized Light Microscopy, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

**Glovebag** - Not more than a 60 x 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which materials and tools may be handled.

**High efficiency particulate air (HEPA) filter** - A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 microns or greater in diameter.

**HEPA vacuum** - Vacuum collection equipment equipped with a HEPA filter system capable of collecting and retaining asbestos fibers.

**Homogeneous area** - An area of surfacing, thermal system insulation or miscellaneous ACM that is uniform in color, texture and date of application.

**HVAC** - Heating, Ventilation and Air Conditioning

**Industrial hygienist** - A professional qualified by education, training, and experience to anticipate, recognize, evaluate and develop controls for occupational health hazards. Meets definition requirements of the American Industrial Hygiene Association (AIHA).

**Industrial hygienist technician** - A person working under the direction of an IH or CIH who has special training, experience, certifications and licenses required for the industrial hygiene work assigned.

**Intact** - The ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

**Lockdown** - Applying encapsulant, after a final visual inspection, on all abated surfaces at the conclusion of ACM removal prior to removal of critical barriers.

**National Emission Standards for Hazardous Air Pollutants (NESHAP)** - EPA's rule to control emissions of asbestos to the environment.

**Negative initial exposure assessment** - A demonstration by the employer which complies with the criteria in 29 CFR 1926.1101 (f)(2)(iii), that employee exposure during an operation is expected to be consistently below the PEL's.

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**Negative pressure** - Air pressure which is lower than the surrounding area, created by exhausting air from a sealed regulated area through HEPA equipped filtration units. OSHA requires maintaining -0.02" water gauge inside the negative pressure enclosure.

**Negative pressure respirator** - A respirator in which the air pressure inside the facepiece is negative during inhalation relative to the air outside the respirator.

**Non-friable ACM** - Material that contains more than 1 percent asbestos but cannot be crumbled, pulverized, or reduced to powder by hand pressure.

**Organic vapor cartridge** - The type of cartridge used on air purifying respirators for organic vapor exposures.

**Outside air** - The air outside buildings and structures, including, but not limited to, the air under a bridge or in an open ferry dock.

**Owner/operator** - Any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

**Penetrating encapsulant** - Encapsulant that is absorbed into the ACM matrix without leaving a surface layer.

**Personal sampling/monitoring** - Representative air samples obtained in the breathing zone of the person using a cassette and battery operated pump to determine asbestos exposure.

**Permissible exposure limit (PEL)** - The level of exposure OSHA allows for an 8 hour time weighted average. For asbestos fibers, the PEL is 0.1 fibers per cc.

**Polarized light microscopy (PLM)** - Light microscopy using dispersion staining techniques and refractive indices to identify and quantify the type(s) of asbestos present in a bulk sample.

**Polyethylene sheeting** - Strong plastic barrier material 4 to 6 mils thick, semi-transparent, sometimes flame retardant in compliance with NFPA 241.

**Positive/negative fit check** - A method of verifying the fit of a respirator by closing off the filters and breathing in or closing off the exhalation valve and breathing out while detecting leakage of the respirator.

**Presumed ACM (PACM)** - Thermal system insulation, surfacing, and flooring material installed in buildings prior to 1981. If the building owner has

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actual knowledge, or should have known through the exercise of due diligence that other materials are ACM, they too must be treated as PACM. The designation of PACM may be rebutted pursuant to 29 CFR 1926.1101 (k)(5).

**Professional IH** - An IH who meets the definition requirements of AIHA; meets the definition requirements of OSHA as a "Competent Person" at 29 CFR 1926.1101 (b); has completed two specialized EPA approved courses on management and supervision of asbestos abatement projects; has formal training in respiratory protection and waste disposal; and has a minimum of four projects of similar complexity with this project of which at least three projects serving as the supervisory IH.

**Project designer** - A person who has successfully completed the training requirements for an asbestos abatement project designer as required by 40 CFR 763 Appendix C, Part I; (B)(5).

**Protection factor** - A value assigned by OSHA/NIOSH to indicate the assigned protection a respirator should provide if worn properly. The number indicates the reduction of exposure level from outside to inside the respirator.

**Qualitative fit test (QLFT)** - A fit test using a challenge material that can be sensed by the wearer if leakage in the respirator occurs.

**Quantitative fit test (QNFT)** - A fit test using a challenge material which is quantified outside and inside the respirator thus allowing the determination of the actual fit factor.

**Regulated area** - An area established by the employer to demarcate where Class I, II, III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work may accumulate; and a work area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed the PEL.

**Regulated ACM (RACM)** - Friable ACM; Category I nonfriable ACM that has become friable; Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading or; Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of the demolition or renovation operation.

**Removal** - All operations where ACM, PACM and/or RACM is taken out or stripped from structures or substrates, including demolition operations.



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**Renovation** - Altering a facility or one or more facility components in any way, including the stripping or removal of asbestos from a facility component which does not involve demolition activity.

**Repair** - Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.

**Shower room** - The portion of the PDF where personnel shower before leaving the regulated area. Also used for bag/drum decontamination in the EDF.

**Standard operating procedures (SOP's)** - Asbestos work procedures required to be submitted by the contractor before work begins.

**Supplied air respirator (SAR)** - A respirator that utilizes an air supply separate from the air in the regulated area.

**Surfacing ACM** - A material containing more than 1 percent asbestos that is sprayed, troweled on or otherwise applied to surfaces for acoustical, fireproofing and other purposes.

**Surfactant** - A chemical added to water to decrease water's surface tension thus making it more penetrating into ACM.

**Thermal system ACM** - A material containing more than 1 percent asbestos applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain.

**Transmission electron microscopy (TEM)** - A microscopy method that can identify and count asbestos fibers.

**VA Industrial Hygienist (VPIH/CIH)** - Department of Veterans Affairs Professional Industrial Hygienist.

**VA Representative** - The VA official responsible for on-going project work.

**Visible emissions** - Any emissions, which are visually detectable without the aid of instruments, coming from ACM/PACM/RACM or ACM waste material.

**Waste generator** - Any owner or operator whose act or process produces asbestos-containing waste material.

**Waste/Equipment decontamination facility (W/EDF)** - The area in which equipment is decontaminated before removal from the regulated area.

**Waste shipment record** - The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

**Wet cleaning** - The process of thoroughly eliminating, by wet methods, any asbestos contamination from surfaces or objects.

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**1.4.3 REFERENCED STANDARDS ORGANIZATIONS**

The following acronyms or abbreviations as referenced in contract/ specification documents are defined to mean the associated names. Names and addresses may be subject to change.

- A. VA Department of Veterans Affairs  
810 Vermont Avenue, NW  
Washington, DC 20420
- B. AIHA American Industrial Hygiene Association  
2700 Prosperity Avenue, Suite 250  
Fairfax, VA 22031  
703-849-8888
- C. ANSI American National Standards Institute  
1430 Broadway  
New York, NY 10018  
212-354-3300
- D. ASTM American Society for Testing and Materials  
1916 Race St.  
Philadelphia, PA 19103  
215-299-5400
- E. CFR Code of Federal Regulations  
Government Printing Office  
Washington, DC 20420
- F. CGA Compressed Gas Association  
1235 Jefferson Davis Highway  
Arlington, VA 22202  
703-979-0900
- G. CS Commercial Standard of the National Institute of Standards and Technology(NIST)  
U. S. Department of Commerce  
Government Printing Office  
Washington, DC 20420
- H. EPA Environmental Protection Agency  
401 M St., SW  
Washington, DC 20460  
202-382-3949
- I. MIL-STD Military Standards/Standardization Division  
Office of the Assistant Secretary of Defense  
Washington, DC 20420

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- J. MSHA Mine Safety and Health Administration  
Respiratory Protection Division  
Ballston Tower #3  
Department of Labor  
Arlington, VA 22203  
703-235-1452
- K. NIST National Institute for Standards and Technology  
U. S. Department of Commerce  
Gaithersburg, MD 20234  
301-921-1000
- L. NEC National Electrical Code (by NFPA)
- M. NEMA National Electrical Manufacturer's Association  
2101 L Street, NW  
Washington, DC 20037
- N. NFPA National Fire Protection Association  
1 Batterymarch Park  
P.O. Box 9101  
Quincy, MA 02269-9101  
800-344-3555
- O. NIOSH National Institutes for Occupational Safety and Health  
4676 Columbia Parkway  
Cincinnati, OH 45226  
513-533-8236
- P. OSHA Occupational Safety and Health Administration  
U.S. Department of Labor  
Government Printing Office  
Washington, DC 20402
- Q. UL Underwriters Laboratory  
333 Pfingsten Rd.  
Northbrook, IL 60062  
312-272-8800
- R. USA United States Army  
Army Chemical Corps  
Department of Defense  
Washington, DC 20420

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**1.5 APPLICABLE CODES AND REGULATIONS**

**1.5.1 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS**

- A. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.
- B. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements or with these specification exists, the most stringent requirement(s) shall be utilized.
- C. Copies of all standards, regulations, codes and other applicable documents, including this specification and those listed in Section 1.5 shall be available at the worksite in the clean change area of the worker decontamination system.

**1.5.2 CONTRACTOR RESPONSIBILITY**

The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to any and all aspects of the abatement project. The contractor is responsible for providing and maintaining training, accreditation, medical exams, medical records, personal protective equipment as required by applicable Federal, State and Local regulations. The contractor shall hold the VA and VPIH/CIH consultants harmless for any failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental requirement on the part of himself, his employees, or his subcontractors. The contractor will incur all costs of the CPIH, including all sampling/analytical costs to assure compliance with OSHA/EPA/State requirements.

**1.5.3 FEDERAL REQUIREMENTS**

Federal requirements which govern some aspect of asbestos abatement include, but are not limited to, the following regulations.

- A. Occupational Safety and Health Administration (OSHA)
  - 1. Title 29 CFR 1926.1101 - Construction Standard for Asbestos
  - 2. Title 29 CFR 1910.132 - Personal Protective Equipment
  - 3. Title 29 CFR 1910.134 - Respiratory Protection
  - 4. Title 29 CFR 1926 - Construction Industry Standards

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5. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
6. Title 29 CFR 1910.1200 - Hazard Communication
7. Title 29 CFR 1910.151 - Medical and First Aid
- B. Environmental Protection Agency (**EPA**)
  1. 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.
  2. 40 CFR 763.80 - Asbestos Hazard Emergency Response Act (AHERA)
- C. Department of Transportation (**DOT**)
  1. Title 49 CFR 100 - 185 - Transportation

**1.5.4 STATE REQUIREMENTS:**

State requirements that apply to the asbestos abatement work, disposal, clearance, etc., include, but are not limited to, the following:

- A. Illinois Administrative Code Part 228
- B. Illinois Department of Public Health 225 ILCS 207

**1.5.5 STANDARDS**

- A. Standards which govern asbestos abatement activities include, but are not limited to, the following:
  1. American National Standards Institute (ANSI) Z9.2-2012 - Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems
  2. ANSI Z88.2 - Practices for Respiratory Protection.
  3. Underwriters Laboratories (UL) 586-90 - UL Standard for Safety of HEPA filter Units, 7th Edition.
- B. Standards which govern encapsulation work include, but are not limited to, the following:
  1. American Society for Testing and Materials (ASTM)
- C. Standards which govern the fire and safety concerns in abatement work include, but are not limited to, the following:
  1. National Fire Protection Association (NFPA) 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
  2. NFPA 701 - Standard Methods for Fire Tests for Flame Resistant Textiles and Film.
  3. NFPA 101 - Life Safety Code

**1.5.6 EPA GUIDANCE DOCUMENTS**

- A. EPA guidance documents which discuss asbestos abatement work activities are listed below. These documents are made part of this section by reference. EPA publications can be ordered from (800) 424-9065.

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- B. Guidance for Controlling ACM in Buildings (Purple Book) EPA 560/5-85-024
- C. Asbestos Waste Management Guidance EPA 530-SW-85-007.
- D. A Guide to Respiratory Protection for the Asbestos Abatement Industry  
EPA-560-OPTS-86-001
- E. Guide to Managing Asbestos in Place (Green Book) TS 799 20T July 1990

**1.5.7 NOTICES**

- A. State and Local agencies: Send written notification as required by state and local regulations including the local fire department prior to beginning any work on ACM as follows:
- B. Copies of notifications shall be submitted to the VA for the facility's records in the same time frame notification is given to EPA, State, and Local authorities.

**1.5.8 PERMITS/LICENSES**

The contractor shall apply for and have all required permits and licenses to perform asbestos abatement work as required by Federal, State, and Local regulations.

**1.5.9 POSTING AND FILING OF REGULATIONS**

Maintain two (2) copies of applicable federal, state, and local regulations. Post one copy of each at the regulated area where workers will have daily access to the regulations and keep another copy in the Contractor's office.

**1.5.10 VA RESPONSIBILITIES**

Prior to commencement of work:

- A. Notify occupants adjacent to regulated areas of project dates and requirements for relocation, if needed. Arrangements must be made prior to starting work for relocation of desks, files, equipment and personal possessions to avoid unauthorized access into the regulated area. **Note: Notification of adjacent personnel is required by OSHA in 29 CFR 1926.1101 (k) to prevent unnecessary or unauthorized access to the regulated area.**
- B. Submit to the Contractor results of background air sampling; including location of samples, person who collected the samples, equipment utilized and method of analysis.
- C. During abatement, submit to the Contractor, results of bulk material analysis and air sampling data collected during the course of the abatement. This information shall not release the Contractor from any responsibility for OSHA compliance.

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**1.5.11 SITE SECURITY**

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent Person shall immediately notify the VA.
- C. A log book shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area must record their name, affiliation, time in, and time out for each entry.
- D. Access to the regulated area shall be through a single decontamination unit, if required. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside, however, they shall be sealed with poly sheeting and taped until needed.
- E. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect adjacent personnel. A 24 hour security system shall be provided at the entrance to the regulated area to assure that all entrants are logged in/out and that only authorized personnel are allowed entrance.
- F. The Abatement Contractor will have the VA's assistance in notifying adjacent personnel of the presence, location and quantity of ACM in the regulated area and enforcement of restricted access by the VA's employees.
- G. The regulated area shall be locked during non-working hours and secured by VA security guards.

**1.5.12 EMERGENCY ACTION PLAN AND ARRANGEMENTS**

- A. An Emergency Action Plan shall be developed by the Contractor prior to commencing abatement activities and shall be agreed to by the Contractor and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a);(b).

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- B. Emergency procedures shall be in written form and prominently posted and available in the regulated area. Everyone, prior to entering the regulated area, must read and sign these procedures to acknowledge understanding of the regulated area layout, location of emergency exits and emergency procedures.
- C. Emergency planning shall include written notification of police, fire, and emergency medical personnel of planned abatement activities; work schedule and layout of regulated area, particularly barriers that may affect response capabilities.
- D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.
- E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
  - 1. For non life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
  - 2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the regulated area, and secure proper medical treatment.
- F. Telephone numbers of all emergency response personnel shall be prominently posted in the clean room, along with the location of the nearest telephone.
- G. The Contractor shall provide verification of first aid/CPR training for personnel responsible for providing first aid/CPR. OSHA requires medical assistance within 3 minutes of a life-threatening injury/illness. Bloodborne Pathogen training shall also be verified for those personnel required to provide first aid/CPR.
- H. The Emergency Action Plan shall provide for a Contingency Plan in the event that an incident occurs that may require the modification of the standard operating procedures during abatement. Such incidents include, but are not limited to, fire; accident; and power failure. The Contractor shall detail procedures to be followed in the event of an



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incident assuring that work is stopped and wetting is continued until correction of the problem.

**1.5.13 PRE-CONSTRUCTION MEETING**

Prior to commencing the work, the Contractor shall meet with the VPCIH to present and review, as appropriate, the items following this paragraph. The Contractor's Competent Person(s) who will be on-site shall participate in the pre-start meeting. The pre-start meeting is to discuss and determine procedures to be used during the project. At this meeting, the Contractor shall provide:

- A. Proof of Contractor licensing.
- B. Proof the Competent Person is trained and accredited and approved for working in this State. Verification of the experience of the Competent Person shall also be presented.
- C. A list of all workers who will participate in the project, including experience and verification of training and accreditation.
- D. A list of and verification of training for all personnel who have current first-aid/CPR training. A minimum of one person per shift must have adequate training.
- E. Current medical written opinions for all personnel working on-site meeting the requirements of 29 CFR 1926.1101 (m).
- F. Current fit-tests for all personnel wearing respirators on-site meeting the requirements of 29 CFR 1926.1101 (h) and Appendix C.
- G. A copy of the Contractor's Standard Operating Procedures for Class I Glovebag Asbestos Abatement. In these procedures, the following information must be detailed, specific for this project.
  1. Regulated area preparation procedures;
  2. Notification requirements procedure of Contractor as required in 29 CFR 1926.1101 (d);
  3. If required, decontamination area set-up/layout and decontamination procedures for employees;
  4. Glovebag abatement methods/procedures and equipment to be used;
  5. Personal protective equipment to be used;
- H. At this meeting the Contractor shall provide all submittals as required.
- I. Procedures for handling, packaging and disposal of asbestos waste.
- J. Emergency Action Plan and Contingency Plan Procedures.

**1.6 PROJECT COORDINATION**

The following are the minimum administrative and supervisory personnel necessary for coordination of the work.

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**1.6.1 PERSONNEL**

- A. Administrative and supervisory personnel shall consist of a qualified Competent Person as defined by OSHA in the Construction Standards and the Asbestos Construction Standard; Contractor Professional Industrial Hygienist and Industrial Hygiene Technicians. These employees are the Contractor's representatives responsible for compliance with these specifications and all other applicable requirements.
- B. Non-supervisory personnel shall consist of an adequate number of qualified personnel to meet the schedule requirements of the project. Personnel shall meet required qualifications. Personnel utilized on-site shall be pre-approved by the VA representative. A request for approval shall be submitted for any person to be employed during the project giving the person's name; qualifications; accreditation card with picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.
- C. Minimum qualifications for Contractor and assigned personnel are:
  - 1. The Contractor has conducted within the last three (3) years, three (3) projects of similar complexity and dollar value as this project; has not been cited and penalized for serious violations of asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; has adequate materials, equipment and supplies to perform the work.
  - 2. The Competent Person has four (4) years of abatement experience of which two (2) years were as the Competent Person on the project; meets the OSHA definition of a Competent Person; has been the Competent Person on two (2) projects of similar size and complexity as this project; has completed EPA AHERA/OSHA/State/Local training requirements/accreditation(s) and refreshers; and has all required OSHA documentation related to medical and respiratory protection.
  - 3. The Contractor Professional Industrial Hygienist (CPIH) shall have five (5) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete

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standard operating procedure for asbestos abatement; has trained abatement personnel for three (3) years; has specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; has completed the NIOSH 582 Course, Contractor/Supervisor course; and has appropriate medical/respiratory protection records/documentation.

4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the standard operating procedures of the Contractor; has one year of asbestos abatement experience; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

**1.7 RESPIRATORY PROTECTION**

**1.7.1 GENERAL - RESPIRATORY PROTECTION PROGRAM**

The Contractor shall develop and implement a Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998 OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910.132;134. ANSI Standard Z88.2-1992 provides excellent guidance for developing a respiratory protection program All respirators used must be NIOSH approved for asbestos abatement activities. The written respiratory protection shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c)(1)(i - ix) - Respiratory Protection Program.

**1.7.2 RESPIRATORY PROTECTION PROGRAM COORDINATOR**

The Respiratory Protection Program Coordinator (RPPC) must be identified and shall have two (2) years experience coordinating the program. The RPPC must provide a signed statement attesting to the fact that the program meets the above requirements.

**1.7.3 SELECTION AND USE OF RESPIRATORS**

The procedure for the selection and use of respirators must be submitted to the VA as part of the Contractor's qualification. The procedure must be written clearly enough for workers to understand. A copy of the Respiratory Protection Program must be available in the clean room of the decontamination unit for reference by employees or authorized visitors.

**1.7.4 MINIMUM RESPIRATORY PROTECTION**

Minimum respiratory protection shall be a full face powered air purifying respirator when fiber levels are maintained consistently at or above 0.5 f/cc. A higher level of respiratory protection may be provided

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or required, depending on fiber levels. Respirator selection shall meet the requirements of 29 CFR 1926.1101 (h); Table 1, except as indicated in this paragraph. Abatement personnel must have a respirator for their exclusive use.

**1.7.5 MEDICAL WRITTEN OPINION**

No employee shall be allowed to wear a respirator unless a physician has determined they are capable of doing so and has issued a written opinion for that person.

**1.7.6 RESPIRATOR FIT TEST**

All personnel wearing respirators shall have a current quantitative fit test which was conducted in accordance with 29 CFR 1910.134 (f) and Appendix A. Fit tests shall be done for PAPR's which have been put into a failure mode.

**1.7.7 RESPIRATOR FIT CHECK**

The Competent Person shall assure that the positive/negative fit check is done each time the respirator is donned by an employee. Headcoverings must cover respirator headstraps. Any situation that prevents an effective facepiece to face seal as evidenced by failure of a fit check shall preclude that person from wearing a respirator until resolution of the problem.

**1.7.8 MAINTENANCE AND CARE OF RESPIRATORS**

The Respiratory Protection Program Coordinator shall submit evidence and documentation showing compliance with 29 CFR 1910.134 (h) maintenance and care of respirators.

**1.8 WORKER PROTECTION**

**1.8.1 TRAINING OF ABATEMENT PERSONNEL**

Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9) and any additional State/Local requirements. Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site.

**1.8.2 MEDICAL EXAMINATIONS**

Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. The physician's written opinion as

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required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the opinion the person has been evaluated for working in a heat stress environment while wearing personal protective equipment and is able to perform the work.

**1.8.3 PERSONAL PROTECTIVE EQUIPMENT**

Provide whole body clothing, head coverings, foot coverings and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project. Duct tape shall be used to secure all suit sleeves to wrists and to secure foot coverings at the ankle.

**1.8.4 REGULATED AREA ENTRY PROCEDURE**

Worker protection shall meet the most stringent requirement. The Competent Person shall ensure that each time workers enter the regulated area, they remove ALL street clothes in the clean room of the decontamination unit and put on new disposable coveralls, head coverings, a clean respirator, and then proceed through the shower room to the equipment room where they put on non-disposable required personal protective equipment.

**1.8.5 DECONTAMINATION PROCEDURE - PAPR**

The Competent Person shall require all personnel to adhere to following decontamination procedures whenever they leave the regulated area.

- A. When exiting the regulated area, remove disposable coveralls, and ALL other clothes, disposable head coverings, and foot coverings or boots in the equipment room.
- B. Still wearing the respirator and completely naked, proceed to the shower. Showering is MANDATORY. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:
  1. Thoroughly wet body including hair and face. If using a PAPR hold blower above head to keep filters dry.
  2. With respirator still in place, thoroughly decontaminate body, hair, respirator face piece, and all other parts of the respirator except the blower and battery pack on a PAPR. Pay particular attention to cleaning the seal between the face and respirator facepiece and under the respirator straps.

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3. Take a deep breath, hold it and/or exhale slowly, completely wetting hair, face, and respirator. While still holding breath, remove the respirator and hold it away from the face before starting to breathe.
- C. Carefully decontaminate the facepiece of the respirator inside and out. If using a PAPR, shut down using the following sequence: a) first cap inlets to filters; b) turn blower off to keep debris collected on the inlet side of the filter from dislodging and contaminating the outside of the unit; c) thoroughly decontaminate blower and hoses; d) carefully decontaminate battery pack with a wet rag being cautious of getting water in the battery pack thus preventing destruction. **THIS PROCEDURE IS NOT A SUBSTITUTE FOR RESPIRATOR CLEANING!**
- D. Shower and wash body completely with soap and water. Rinse thoroughly.
- E. Rinse shower room walls and floor to drain prior to exiting.
- F. Proceed from shower to clean room; dry off and change into street clothes or into new disposable work clothing.

**1.8.6 REGULATED AREA REQUIREMENTS**

The Competent Person shall meet all requirements of 29 CFR 1926.1101 (o) and assure that all requirements for Class I glovebag regulated areas at 29 CFR 1926.1101 (e) are met. All personnel in the regulated area shall not be allowed to eat, drink, smoke, chew tobacco or gum, apply cosmetics, or in any way interfere with the fit of their respirator.

**1.9 DECONTAMINATION FACILITIES**

**1.9.1 DESCRIPTION**

Provide each regulated area with separate personnel (PDF) and waste/equipment decontamination facilities (W/EDF). Ensure that the PDF is the only means of ingress and egress to the regulated area and that all equipment, bagged waste, and other material exit the regulated area only through the W/EDF.

**1.9.2 GENERAL REQUIREMENTS**

All personnel entering or exiting a regulated area shall follow the requirements at 29 CFR 1926.1101 (j)(1) and these specifications. All equipment and materials must exit the regulated area through the W/EDF and be decontaminated in accordance with these specifications. Walls and ceilings of the PDF and W/EDF must be constructed of a minimum of 3 layers of 6 mil opaque fire retardant polyethylene sheeting and be securely attached to existing building components and/or an adequate temporary framework. A minimum of 3 layers of 6 mil poly shall also be used to cover the floor under the PDF and W/EDF units. Construct doors

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so that they overlap and secure to adjacent surfaces. Weigh sheets with layers of duct tape so that they close quickly after release. Put arrows on sheets so they show direction of travel and overlap. If the building adjacent area is occupied, construct a solid barrier on the occupied side(s) to protect the sheeting.

**1.9.3 TEMPORARY FACILITIES TO THE PDF AND W/EDF**

The Competent Person shall provide temporary water service connections to the PDF and W/EDF. Backflow prevention must be provided at the point of connection to the VA system. Water supply must be of adequate pressure and meet requirements of 29 CFR 1910.141(d)(3). Provide adequate temporary electric power with ground fault protection and overhead wiring in the PDF and W/EDF. Provide a sub-panel for all temporary power in the clean room. Provide adequate lighting to provide a minimum of 50 foot candles in the PDF and W/EDF. Provide temporary heat to maintain 70°F throughout the PDF and W/EDF.

**1.9.4 PERSONNEL DECONTAMINATION FACILITY (PDF)**

The Competent Person shall provide a PDF consisting of shower room which is contiguous to a clean room and equipment room. The PDF must be sized to accommodate the number of personnel scheduled for the project. The shower room, located in the center of the PDF, shall be fitted with as many portable showers as necessary to insure all employees can complete the entire decontamination procedure within 15 minutes. The PDF shall be constructed of opaque poly for privacy. The PDF shall be constructed to eliminate any parallel routes of egress without showering.

1. Clean Room: The clean room must be physically and visually separated from the rest of the building to protect the privacy of personnel changing clothes. The clean room shall be constructed of at least 2 layers of 6 mil fire retardant poly to provide an air tight room. Provide a minimum of 2 - 900 mm (3 foot) wide flapped doorways. One doorway shall be the entry from outside the PDF and the second doorway shall be to the shower room of the PDF. The floor of the clean room shall be maintained in a clean, dry condition. Shower overflow shall not be allowed into the clean room. An adequate supply of disposable towels shall be provided. Provide storage lockers per person. A portable fire extinguisher, Type ABC, shall be provided in accordance with OSHA and NFPA Standard 10. All persons entering the regulated area shall remove all street clothing in the clean room and dress in disposable protective clothing and respiratory protection.

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- Any person entering the clean room does so either from the outside with street clothing on or is coming from the shower room completely naked and thoroughly washed. Females required to enter the regulated area shall be ensured of their privacy throughout the entry/exit process by posting guards at both entry points to the PDF so no male can enter or exit the PDF during her stay in the PDF.
2. Shower Room: The Competent Person shall assure that the shower room is a completely water tight compartment to be used for the movement of all personnel from the clean room to the equipment room and for the showering of all personnel going from the regulated area to the clean room. Each shower shall be constructed so water runs down the walls of the shower and into a drip pan. Install a freely draining smooth floor on top of the shower pan. The shower room shall be separated from the rest of the building and from the clean room and equipment room using air tight walls made from at least 3 layers of 6 mil fire retardant poly. The shower shall be equipped with a shower head and controls, hot and cold water, drainage, soap dish and continuous supply of soap, and shall be maintained in a sanitary condition throughout its use. The controls shall be arranged so an individual can shower without assistance. Provide a flexible hose shower head, hose bibs and all other items shown on Shower Schematic. Waste water will be pumped to a drain after being filtered through a minimum of a 100 micron sock in the shower drain; a 20 micron filter; and a final 5 micron filter. Filters will be changed a minimum of daily or more often as needed. Filter changes must be done in the shower to prevent loss of contaminated water. Hose down all shower surfaces after each shift and clean any debris from the shower pan. Residue is to be disposed of as asbestos waste.
  3. Equipment Room: The Competent Person shall provide an equipment room which shall be an air tight compartment for the storage of work equipment, reusable footwear and for use as a change station for personnel exiting the regulated area. The equipment room shall be separated from the regulated area by a minimum 3 foot wide door made of 2 layers of 6 mil fire retardant poly. The equipment room shall be separated from the regulated area, the shower room and the rest of the building by air tight walls and ceiling constructed of a minimum of 3 layers of 6 mil fire retardant poly. Damp wipe all surfaces of the equipment room after each shift change. Provide an additional



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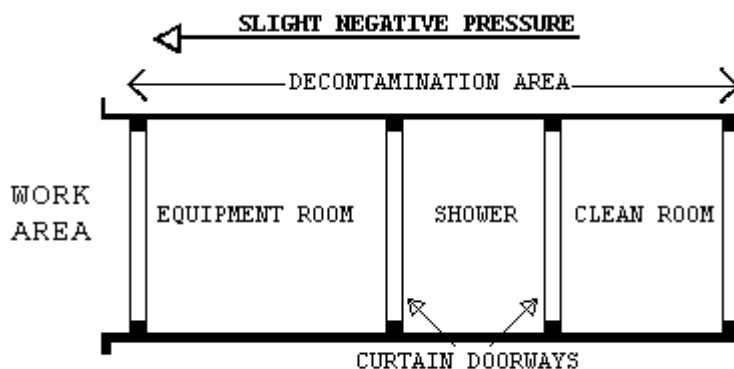
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loose layer of 6 mil fire retardant poly per shift change and remove this layer after each shift. Provide a temporary electrical sub-panel equipped with GFCI in this room to accommodate any equipment required in the regulated area.

4. The PDF shall consist of the following: Clean room at the entrance followed by a shower room followed by an equipment room leading to the regulated area. Each doorway in the PDF is minimum of 2 layers of 6 mil fire retardant poly.



**1.9.5 WASTE/EQUIPMENT DECONTAMINATION FACILITY (W/EDF)**

The Competent Person shall provide a W/EDF consisting of a wash room, holding room, and clean room for removal of all waste, equipment and contaminated material from the regulated area. Personnel shall not enter or exit the W/EDF except in the event of an emergency. Clean debris and residue in the W/EDF daily. All surfaces in the W/EDF shall be wiped/hosed down after each shift and all debris shall be cleaned from the shower pan. The W/EDF shall consist of the following:

1. Wash Down Station: Provide an enclosed shower unit in the regulated area just outside the Wash Room as an equipment, bag and container cleaning station.
2. Wash Room: Provide a wash room for cleaning of bagged or containerized asbestos containing waste materials passed from the regulated area. Construct the wash room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. Locate the wash room so that packaged materials, after being wiped clean, can be passed to the Holding Room. Doorways in the wash room shall be constructed of 2 layers of 6 mil fire retardant poly.

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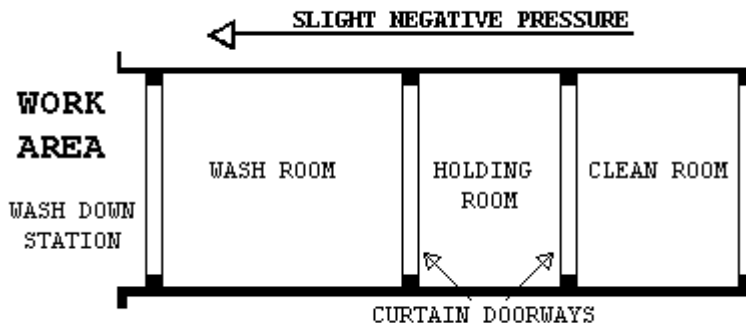
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3. Holding Room: Provide a holding room as a drop location for bagged materials passed from the wash room. Construct the holding room using 50 x 100 mm (2" x 4") wood framing and 3 layers of 6 mil fire retardant poly. The holding room shall be located so that bagged material cannot be passed from the wash room to the clean room unless it goes through the holding room. Doorways in the holding room shall be constructed of 2 layers of 6 mil fire retardant poly.
4. Clean Room: Provide a clean room to isolate the holding room from the building exterior. Construct the clean room using 2 x 4 wood framing and 2 layers of 6 mil fire retardant poly. The clean room shall be located so as to provide access to the holding room from the building exterior. Doorways to the clean room shall be constructed of two layers of 6 mil fire retardant poly.
5. The W/EDF shall be provided as follows: Wash Room leading to a Holding Room followed by a Clean Room leading to outside the regulated area. See diagram.



**1.9.6 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES**

At washdown station in the regulated area, thoroughly wet clean contaminated equipment and/or sealed polyethylene bags and pass into Wash Room after visual inspection. When passing anything into the Wash Room, close all doorways of the W/EDF, other than the doorway between the washdown station and the Wash Room. Keep all outside personnel clear of the W/EDF. Once inside the Wash Room, wet clean the equipment and/or bags. After cleaning and inspection, pass items into the Holding Room. Close all doorways except the doorway between the Holding Room and the Clean Room. Workers from the Clean Room/Exterior shall enter the Holding

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Room and remove the decontaminated/cleaned equipment/bags for removal and disposal. These personnel will not be required to wear PPE. At no time shall personnel from the clean side be allowed to enter the Wash Room.

**PART 2 - PRODUCTS, MATERIALS AND EQUIPMENT**

**2.1 MATERIALS AND EQUIPMENT**

**2.1.1 GENERAL REQUIREMENTS (ALL ABATEMENT PROJECTS)**

Prior to the start of work, the Contractor shall provide and maintain a sufficient quantity of materials and equipment to assure continuous and efficient work throughout the duration of the project. Work shall not start unless the following items have been delivered to the site and the CPIH has submitted verification to the VA's representative to this effect:

- A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
- B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated/work area until abatement is completed.
- C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized place.
- D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.
- E. Poly sheeting put under the glovebag regulated area shall be a minimum of 6 mils in thickness.
- F. If required, the method of attaching polyethylene sheeting shall be agreed upon in advance by the Contractor and the VA and selected to minimize damage to equipment and surfaces.
- G. Polyethylene sheeting utilized for personnel decontamination facility shall be opaque white or black in color, 6 mil fire retardant poly.
- H. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps and waste water filtration system shall be provided by the Contractor.

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- I. An adequate number of HEPA vacuums, scrapers, sprayers, nylon brushes, brooms, disposable mops, rags, sponges, staple guns, shovels, ladders and scaffolding of suitable height and length as well as meeting OSHA requirements shall be provided. Fall protection devices, water hose to reach all areas in the regulated area, airless spray equipment, and any other tools, materials or equipment required to conduct the abatement project shall also be provided. All electrically operated hand tools, equipment, electric cords shall be equipped with GFCI protection.
- J. Special protection for objects in the regulated area shall be detailed (e.g., plywood over carpeting or hardwood floors to prevent damage from scaffolds, water, and falling material).
- K. Disposal bags - 2 layers of 6 mil, for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.
- L. The VA shall be provided a copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication. Chlorinated compounds shall not be used with any spray adhesive or other product. Appropriate encapsulant(s) shall be provided.
- M. OSHA DANGER demarcation signs, as many and as required by OSHA 29 CFR 1926.1101(k)(7) shall be provided and placed by the Competent Person. All other posters and notices required by Federal and State regulations shall be posted in the Clean Room.
- N. Adequate and appropriate PPE for the project and number of personnel/shifts shall be provided. All personal protective equipment issued must be based on a hazard assessment conducted under 29 CFR 1910.132(d).

**2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA**

**2.2.1 GENERAL**

Using critical barriers, seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All horizontal surfaces in the regulated area must be covered with 2 layers of 6 mil fire retardant poly to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated, immediately stop work and clean up the contamination at no additional cost to the Government. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section 2.2.8; FIRESTOPPING.

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**2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA**

- A. Place all tools, scaffolding, materials and equipment needed for working in the regulated area prior to erecting any plastic sheeting. Remove all uncontaminated removable furniture, equipment and/or supplies from the regulated area before commencing work, or completely cover with 2 layers of 6-mil fire retardant poly sheeting and secure with duct tape. Lock out and tag out any HVAC systems in the regulated area.

**2.2.3 CONTROLLING ACCESS TO THE REGULATED AREA**

- A. Access to the regulated area is allowed only through the personnel decontamination facility (PDF), if required. All other means of access shall be eliminated and OSHA Danger demarcation signs posted as required by OSHA. If the regulated area is adjacent to or within view of an occupied area, provide a visual barrier of 6 mil opaque fire retardant poly sheeting to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier must be solid.

**2.2.4 CRITICAL BARRIERS**

- A. Completely separate any openings into the regulated area from adjacent areas using fire retardant poly at least 6 mils thick and duct tape. Individually seal with 2 layers of 6 mil poly and duct tape all HVAC openings into the regulated area. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other objects in the regulated area. Heat must be shut off any objects covered with poly.

**2.2.5 SECONDARY BARRIERS**

- A. A loose layer of 6 mil fire retardant poly shall be used as a drop cloth to protect the floor/horizontal surfaces from debris generated during the glovebag abatement. This layer shall be replaced as needed during the work.

**2.2.6 EXTENSION OF THE REGULATED AREA**

- A. If the enclosure of the regulated area is breached in any way that could allow contamination to occur, the affected area shall be included in the regulated area and constructed as per this section. If the affected area cannot be added to the regulated area, decontamination measures must be started immediately and continue until air monitoring indicates background levels are met.

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**2.2.7 FIRESTOPPING**

- A. Through penetrations caused by cables, cable trays, pipes, sleeves must be firestopped with a fire-rated firestop system providing an air tight seal.
- B. Firestop materials that are not equal to the wall or ceiling penetrated shall be brought to the attention of the VA Representative. The Contractor shall list all areas of penetration, the type of sealant used, and whether or not the location is fire rated. Any discovery of penetrations during abatement shall be brought to the attention of the VA Representative immediately. All walls, floors and ceilings are considered fire rated unless otherwise determined by the VA Representative or Fire Marshall.
- C. Any visible openings whether or not caused by a penetration shall be reported by the Contractor to the VA Representative for a sealant system determination. Firestops shall meet ASTM E814 and UL 1479 requirements for the opening size, penetrant, and fire rating needed.

**2.3 MONITORING, INSPECTION AND TESTING**

**2.3.1 GENERAL**

- A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. The CPIH shall periodically inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.
- B. The VA will employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH will perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors will not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the

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work in accordance with contract/specification requirements, to perform continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services will be borne by the VA except for any repeat of final inspection and testing that may be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.

- C. If fibers counted by the VPIH/CIH during abatement work, either inside or outside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed the specified respective limits, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. Request must be in writing and submitted to the VA's representative. Cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis will be the responsibility of the CPIH with review and approval of the VPIH/CIH. An agreement between the CPIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

**2.3.2 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT**

- A. The purpose of the work of the VPIH/CIH is to: Assure quality; resolve problems; and prevent the spread of contamination beyond the regulated area. In addition, their work includes performing the final inspection and testing to determine whether the regulated area or building has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:
1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
  2. Task 2: Perform continuous air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect any faults in the regulated area isolation and any adverse impact on the surroundings from regulated area activities.

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3. Task 3: Perform unannounced visits to spot check overall compliance of work with contract/specifications. These visits may include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.
  4. Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of unforeseen developments, etc.
  5. Task 5: Perform, in the presence of the VA representative, final inspection and testing of a decontaminated regulated area or building at the conclusion of the abatement and clean-up work to certify compliance with all regulations and the VA requirements/specifications.
  6. Task 6: Issue certificate of decontamination for each regulated area or building and project report.
- B. All data, inspection results and testing results generated by the VPIH/CIH will be available to the Contractor for information and consideration. The Contractor shall cooperate with and support the VPIH/CIH for efficient and smooth performance of their work.
- C. The monitoring and inspection results of the VPIH/CIH will be used by the VA to issue any Stop Removal orders to the Contractor during abatement work and to accept or reject a regulated area or building as decontaminated.

**2.3.3 MONITORING, INSPECTION AND TESTING BY ABATEMENT CONTRACTOR CPIH**

The CPIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor's personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor /Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in air sampling and analysis. The IH Technician shall have a NIOSH 582 Course or equivalent and show proof. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency Analytic Testing program of AIHA for fiber counting quality control



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assurance. The IH Technician shall also be an accredited EPA/State Contractor/Supervisor and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation. The analytic laboratory used by the Contractor to analyze the samples shall be AIHA accredited for asbestos PAT. A daily log documenting all OSHA requirements for air monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH. The log will contain, at a minimum, information on personnel or area sampled, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH responsibilities.

**2.4 STANDARD OPERATING PROCEDURES**

The Contractor shall have established Standard Operating Procedures (SOP's) in printed form and loose leaf folder consisting of simplified text, diagrams, sketches, and pictures that establish and explain clearly the ways and procedures to be followed during all phases of the work by the Contractor's personnel. The SOP's must be modified as needed to address specific requirements of the project. The SOP's shall be submitted for review and approval prior to the start of any abatement work. The minimum topics and areas to be covered by the SOP's are:

- A. Minimum Personnel Qualifications
- B. Contingency Plans and Arrangements
- C. Security and Safety Procedures
- D. Respiratory Protection/Personal Protective Equipment Program and Training
- E. Medical Surveillance Program and Recordkeeping
- F. Regulated Area Requirements for Glovebag Abatement
- G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)
- H. Monitoring, Inspections, and Testing
- I. Removal Procedures For Piping ACM Using the Glovebag Method

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- J. Disposal of ACM waste
- K. Regulated Area Decontamination/Clean-up
- L. Regulated Area Visual and Air Clearance
- M. Project Completion/Closeout

**2.5 SUBMITTALS**

**2.5.1 PRE-CONSTRUCTION MEETING SUBMITTALS**

Submit to the VA a minimum of 14 days prior to the pre-start meeting the following for review and approval. Meeting this requirement is a prerequisite for the pre-start meeting for this project. The submittal shall be organized such that the required information is provided in order as listed below. Each section shall include a separate title page referencing the pre-start meeting submittal section.

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
- C. Submit Standard Operating Procedures developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH.
- D. Submit the specifics of the materials and equipment to be used for this project with brand names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
  - 1. HEPA vacuums, air monitoring pumps, calibration devices, and emergency power generating system.
  - 2. Waste water filtration system, shower system, critical/floor barriers.
  - 3. Encapsulants, surfactants, hand held sprayers, airless sprayers, glovebags, fire extinguishers.
  - 4. Personal protective equipment.
  - 5. Fire safety equipment to be used in the regulated area.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used

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for transportation; and name, address, and phone number of subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.

- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
  - 1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project:  
Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; Completion Date
  - 2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years:  
Project Name; Reason; Date; Reference Name/Number; Resolution
  - 3. List asbestos regulatory citations, penalties, damages paid and legal actions taken against the company in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; provide references; phone numbers; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
  - 1. CPIH: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of SOP's developed; medical opinion; current respirator fit test.

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2. Competent Person(s)/Supervisor(s): Number; names; years of abatement experience as Competent Person /Supervisor; list of similar projects as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion; current respirator fit test.
3. Workers: Numbers; names; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion; current respirator fit test.
- J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain English the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of SOP's incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who does and how is air monitoring conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and standard operating procedures; copies of monitoring results of the five referenced projects listed and analytical method(s) used.
- K. When rental equipment is to be used in regulated areas or used to transport asbestos waste, the contractor shall assure complete decontamination of the rental equipment before return to the rental agency.
  1. Submit, before the start of work, the manufacturer's technical data and MSDS for encapsulants used on the project. Provide application instructions also.

**2.5.2 SUBMITTALS DURING ABATEMENT**

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as critical barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWA's/EL's. Submit this daily log to VA's representative.
- B. The CPIH shall document and maintain the following during abatement and submit as appropriate to the VA's representative.

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1. Inspection and approval of the regulated area preparation prior to start of work and daily during work.
2. Removal of any poly critical/floor barriers.
3. Visual inspection/testing by the CPIH prior to application of lockdown encapsulation.
4. Packaging and removal of ACM waste from regulated area.
5. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the VA's representative on a weekly basis.

**2.5.3 SUBMITTALS AT COMPLETION OF ABATEMENT**

The CPIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. The report shall include a certificate of completion, signed and dated by the CPIH, in accordance with Attachment #1. The VA Representative will forward the abatement report to the Medical Center after completion of the project.

**2.6 ENCAPSULANTS**

**2.6.1 TYPES OF ENCAPSULANTS**

- A. The following four types of encapsulants must comply with performance requirements as stated in paragraph 2.6.2:
  1. Removal encapsulant - used as a wetting agent to remove ACM.
  2. Bridging encapsulant - provides a tough, durable coating on ACM.
  3. Penetrating encapsulant - penetrates/encapsulates ACM at least 13 mm (1/2").
  4. Lockdown encapsulant - seals microscopic fibers on surfaces after ACM removal.

**2.6.2 PERFORMANCE REQUIREMENTS**

Encapsulants shall meet the latest requirements of EPA; shall not contain toxic or hazardous substances; or solvents; and shall comply with the following performance requirements:

- A. General Requirements for all Encapsulants:
  1. ASTM E84: Flame spread of 25; smoke emission of 50.
  2. University of Pittsburgh Protocol: Combustion Toxicity; zero mortality.
  3. ASTM C732: Accelerated Aging Test; Life Expectancy - 20 years.
  4. ASTM E96: Permeability - minimum of 0.4 perms.
- B. Bridging/Penetrating Encapsulants:

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1. ASTM E736: Cohesion/Adhesion Test - 24 kPa (50 lbs/ft<sup>2</sup>).
  2. ASTM E119: Fire Resistance - 3 hours (Classified by UL for use on fibrous/cementitious fireproofing).
  3. ASTM D2794: Gardner Impact Test; Impact Resistance - minimum 11.5 kg-mm (43 in/lb).
  4. ASTM D522: Mandrel Bend Test; Flexibility - no rupture or cracking.
- C. Lockdown Encapsulants:
1. ASTM E119: Fire resistance - 3 hours (tested with fireproofing over encapsulant applied directly to steel member).
  2. ASTM E736: Bond Strength - 48 kPa (100 lbs/ft<sup>2</sup>) (test compatibility with cementitious and fibrous fireproofing).
  3. In certain situations, encapsulants may have to be applied to hot pipes/equipment. The encapsulant must be able to withstand high temperatures without cracking or off-gassing any noxious vapors during application.

## **2.7 CERTIFICATES OF COMPLIANCE**

The Contractor shall submit to the VA representative certification from the manufacturer indicating compliance with performance requirements for encapsulants when applied according to manufacturer recommendations.

## **2.8 RECYCLABLE PROTECTIVE CLOTHING**

If recyclable clothing is provided, all requirements of EPA, DOT and OSHA shall be met.

## **PART 3 - EXECUTION**

### **3.1 PRE-ABATEMENT ACTIVITIES**

#### **3.1.1 PRE-ABATEMENT MEETING**

The VA representative, upon receipt, review, and substantial approval of all pre-abatement submittals and verification by the CPIH that all materials and equipment required for the project are on the site, will arrange for a pre-abatement meeting between the Contractor, the CPIH, Competent Person(s), the VA representative(s), and the VPIH/CIH. The purpose of the meeting is to discuss any aspect of the submittals needing clarification or amplification and to discuss any aspect of the project execution and the sequence of the operation. The Contractor shall be prepared to provide any supplemental information/documentation to the VA's representative regarding any submittals, documentation, materials or equipment. Upon satisfactory resolution of any outstanding issues, the VA's representative will issue a written order to proceed to

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the Contractor. No abatement work of any kind described in the following provisions shall be initiated prior to the VA written order to proceed.

**3.1.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS**

Before any work begins on the construction of the regulated area, the Contractor will:

- A. Conduct a space-by-space inspection with an authorized VA representative and prepare a written inventory of all existing damage in those spaces where asbestos abatement will occur. Still or video photography may be used to supplement the written damage inventory. Document will be signed and certified as accurate by both parties.
- B. The VA Representative, the Contractor, and the VPIH/CIH must be aware of 10/95 A/E Quality Alert indicating the failure to identify asbestos as applicable to glovebag abatement in the areas listed. Make sure these areas are looked at/reviewed on the project: Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside chases/walls; transite piping/ductwork/sheets; behind radiators; below window sills; water/sewer lines; electrical conduit coverings; steam line trench coverings.
- C. Clean and remove or properly protect from contamination all furniture, machinery, equipment, curtains, drapes, blinds, and other movable objects which the Contractor is required to remove from the regulated area.
- D. Shut down and seal with a minimum of 2 layers of 6 mil fire retardant poly all HVAC systems serving the regulated area. The regulated area critical barriers shall be completely isolated from any other air in the building. The VA's representative will monitor the isolation provision.
- E. Shut down and lock out in accordance with 29 CFR 1910.147 all electrical circuits which pose a potential hazard. Electrical arrangements will be tailored to the particular regulated area and the systems involved. All electrical circuits affected will be turned off at the circuit box outside the regulated area, not just the wall switch. The goal is to eliminate the potential for electrical shock which is a major threat to life in the regulated area due to water use and possible energized circuits. Electrical lines used to power equipment in the regulated area shall conform to all electrical safety standards and shall be isolated by the use of a ground fault circuit interrupter (GFCI). All GFCI shall be tested prior to use. The VA's representative will monitor the electrical shutdown.

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- F. If required, remove and dispose of carpeting from floors in the regulated area.
- G. Inspect existing firestopping in the regulated area. Correct as needed.

**3.1.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS**

- A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
- B. Upon completion of all preparatory work, the CPIH will inspect the work and systems and will notify the VA's representative when the work is completed in accordance with this specification. The VA's representative may inspect the regulated area and the systems with the VPIH/CIH and may require that upon satisfactory inspection, the Contractor's employees perform all major aspects of the approved SOP's, especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation.
- C. The CPIH shall document the pre-abatement activities described above and deliver a copy to the VA's representative.
- D. Upon satisfactory inspection of the installation of and operation of systems the VA's representative will notify the Contractor in writing to proceed with the asbestos abatement work in accordance with this specification.

**3.2 REGULATED AREA PREPARATIONS**

**3.2.1 OSHA DANGER SIGNS**

Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.

**3.2.2 SHUT DOWN - LOCK OUT ELECTRICAL**

Shut down and lock out electric power to the regulated area. Provide temporary power and lighting. Insure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code requirements and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.



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**3.2.3 SHUT DOWN - LOCK OUT HVAC**

Shut down and lock out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area.

Investigate the regulated area and agree on pre-abatement condition with the VA's representative. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6-mil poly disposal bags for disposal as asbestos waste.

**3.2.4 SANITARY FACILITIES**

The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

**3.2.5 WATER FOR ABATEMENT**

The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to the shower(s) shall be supplied with backflow prevention.

**3.2.6 PRE-CLEANING MOVABLE OBJECTS**

Pre-clean all movable objects within the regulated area using a HEPA filtered vacuum and/or wet cleaning methods as appropriate. After cleaning, these objects shall be removed from the regulated area and carefully stored in an uncontaminated location.

**3.2.7 PRE-CLEANING FIXED OBJECTS**

Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention must be paid to machinery behind grills or gratings where access may be difficult but contamination may be significant. Also, pay particular attention to wall, floor and ceiling penetration behind fixed items. After precleaning, enclose fixed objects with 2 layers of 6-mil poly and seal securely in place with duct tape. Objects (e.g., permanent fixtures, shelves, electronic equipment, laboratory tables, sprinklers, alarm systems, closed circuit TV equipment and computer cables) which must remain in the regulated area and that require special ventilation or enclosure requirements should be designated here along with specified means of protection. Contact the manufacturer for special protection requirements.

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**3.2.8 PRE-CLEANING SURFACES IN THE REGULATED AREA**

Pre-clean all surfaces in the regulated area using HEPA filtered vacuums and/or wet cleaning methods as appropriate. Do not use any methods that would raise dust such as dry sweeping or vacuuming with equipment not equipped with HEPA filters. Do not disturb asbestos-containing materials during this pre-cleaning phase.

**3.3 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA**

**3.3.1 GENERAL**

Seal off any openings at the perimeter of the regulated area with critical barriers to completely isolate the regulated area and to contain all airborne asbestos contamination created by the abatement activities. Should the adjacent area past the regulated area become contaminated due to improper work activities, the Contractor shall suspend work inside the regulated area, continue wetting, and clean the adjacent areas in accordance with procedures described in these specifications. Any and all costs associated with the adjacent area cleanup shall not be borne by the VA.

**3.3.2 PREPARATION PRIOR TO SEALING OFF**

Place all materials, equipment and supplies necessary to isolate the regulated area inside the regulated area. Remove all movable material/equipment as described above and secure all unmovable material/equipment as described above. Properly secured material/equipment shall be considered to be outside the regulated area.

**3.3.3 CONTROLLING ACCESS TO THE REGULATED AREA**

Access to the regulated area shall be permitted only through the PDF. All other means of access shall be closed off by proper sealing and DANGER signs posted on the clean side of the regulated area where it is adjacent to or within view of any occupiable area. An opaque visual barrier of 6 mil poly shall be provided so that the abatement work is not visible to any building occupants. If the area adjacent to the regulated area is accessible to the public, construct a solid barrier on the public side of the sheeting for protection and isolation of the project. The barrier shall be constructed with nominal 2" x 4" (50mm x 100mm) wood or metal studs 16" (400mm) on centers, securely anchored to prevent movement and covered with a minimum of 1/2" (12.5mm) plywood. Provide an appropriate number of OSHA DANGER signs for each visual and physical barrier. Any alternative method must be given a written approval by the VA's representative.

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**3.3.4 CRITICAL BARRIERS**

The regulated area must be completely separated from the adjacent areas, and the outside by at least 2 layers of 6 mil fire retardant poly and duct tape/spray adhesive. Individually seal all supply and exhaust ventilation openings, lighting fixtures, clocks, doorways, windows, convectors, speakers, and other openings into the regulated area with 2 layers of 6 mil fire retardant poly, and taped securely in place with duct tape/spray adhesive. Critical barriers must remain in place until all work and clearances have been completed. Light fixtures shall not be operational during abatement. Auxiliary lighting shall be provided. If needed, provide plywood squares 6" x 6" x 3/8" (150mm x 150mm x 18mm) held in place with one 6d smooth masonry/galvanized nail driven through the center of the plywood square and duct tape on the poly so as to clamp the poly to the wall/surface. Locate plywood squares at each end, corner, and 4' (1200mm) maximum on centers.

**3.3.5 EXTENSION OF THE REGULATED AREA**

If the regulated area barrier is breached in any manner that could allow the passage of asbestos fibers or debris, the Competent Person shall immediately stop work, continue wetting, and proceed to extend the regulated area to enclose the affected area as per procedures described in this specification. If the affected area cannot be enclosed, decontamination measures and cleanup shall start immediately. All personnel shall be isolated from the affected area until decontamination/cleanup is completed as verified by visual inspection and air monitoring. Air monitoring at completion must indicate background levels.

**3.3.6 FLOOR BARRIERS:**

All floors within 10' of glovebag work shall be covered with 2 layers of 6 mil fire retardant poly.

**3.4 REMOVAL OF PIPING ACM**

**3.4.1 WETTING MATERIALS**

- A. Use amended water for the wetting of ACM prior to removal. The Competent Person shall assure the wetting of ACM meets the definition of "adequately wet" in the EPA NESHAP's regulation and OSHA's "wet methods" for the duration of the project. A removal encapsulant may be used instead of amended water with written approval of the VA's representative.

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- B. Amended Water: Provide water to which a surfactant has been added shall be used to wet the ACM and reduce the potential for fiber release during disturbance of ACM. The mixture must be equal to or greater than the wetting provided by water amended by a surfactant consisting one ounce of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with 5 gallons (19L) of water.
- C. Removal Encapsulant: Provide a penetrating encapsulant designed specifically for the removal of ACM. The material must, when used, result in adequate wetting of the ACM and retard fiber release during disturbance equal to or greater than the amended water described above in B.

**3.4.2 SECONDARY BARRIER AND WALKWAYS**

- A. Install as a drop cloth a 6 mil poly sheet at the beginning of each work shift where removal is to be done during that shift. Completely floors within 10 feet (3M) of the area where work is to done. Secure the secondary barrier with duct tape to prevent debris from getting behind it. Remove the secondary barrier at the end of the shift or as work in the area is completed. Keep residue on the secondary barrier wetted. When removing, fold inward to prevent spillage and place in a disposal bag.
- B. Install walkways using 6 mil poly between the regulated area and the decontamination facilities (PDF and W/EDF) to protect the floor from contamination and damage. Install the walkways at the beginning of each shift and remove at the end of each shift.

**3.4.3 WET REMOVAL OF ACM**

- A. Using acceptable glovebag procedures, adequately and thoroughly wet the ACM to be removed prior to removal to reduce/prevent fiber release to the air. Adequate time must be allowed for the amended water to saturate the ACM. Abatement personnel must not disturb dry ACM. Use a fine spray of amended water or removal encapsulant. Saturate the material sufficiently to wet to the substrate without causing excessive dripping. The material must be sprayed repeatedly/continuously during the removal process in order to maintain adequately wet conditions. Removal encapsulants must be applied in accordance with the manufacturer's written instructions. Perforate or carefully separate, using wet methods, an outer covering that is painted or jacketed in order to allow penetration and wetting of the material. Where necessary, carefully remove covering while wetting to minimize fiber release. In no event

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shall dry removal occur except in the case of electrical hazards or a greater safety issue is possible!

**3.4.4 DISCOVERED MATERIALS**

During abatement, demolition, renovation, and/or further inspection, a potential exists for encountering materials not previously identified to become revealed. Upon discovery of a material not previously identified, the contractor shall immediately notify the owner who will arrange for and coordinate materials sample collection and analysis if necessary. The contractor is not permitted to collect any material samples for asbestos or other hazardous material analysis.

**3.5 GLOVEBAG REMOVAL PROCEDURES**

**3.5.1 GENERAL**

All applicable OSHA requirements and glovebag manufacturer's recommendations shall be met during glove bagging operations.

1. Mix the surfactant with water in the garden sprayer, following the manufacturer's directions.
2. Have each employee put on a HEPA filtered respirator approved for asbestos and check the fit using the positive/negative fit check.
3. Have each employee put on a disposable full-body suit. Remember, the hood goes over the respirator straps.
4. Check closely the integrity of the glove bag to be used. Check all seams, gloves, sleeves, and glove openings. OSHA requires the bottom of the bag to be seamless.
5. Check the pipe where the work will be performed. If it is damaged (broken lagging, hanging, etc.), wrap the entire length of the pipe in poly sheeting and "candy stripe" it with duct tape.
6. Attach glovebag with required tools per manufacturer's instructions.
7. Using the smoke tube and aspirator bulb, test 10% of glovebags by placing the tube into the water porthole (two-inch opening to glove bag), and fill the bag with smoke and squeeze it. If leaks are found, they should be taped closed using duct tape and the bag should be retested with smoke.
8. Insert the wand from the water sprayer through the water porthole.
9. Insert the hose end from a HEPA vacuum into the upper portion of the glove bag.
10. Wet and remove the pipe insulation.
11. If the section of pipe is covered with an aluminum jacket, remove it first using the wire cutters to cut any bands and the tin snips to

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- remove the aluminum. It is important to fold the sharp edges in to prevent cutting the bag when placing it in the bottom.
12. When the work is complete, spray the upper portion of the bag and clean-push all residue into the bottom of the bag with the other waste material. Be very thorough. Use adequate water.
  13. Put all tools, after washing them off in the bag, in one of the sleeves of glove bag and turn it inside out, drawing it outside of the bag. Twist the sleeve tightly several times to seal it and tape it several tight turns with duct tape. Cut through the middle of the duct tape and remove the sleeve. Put the sleeve in the next glove bag or put it in a bucket of water to decontaminate the tools after cutting the sleeve open.
  14. Turn on the HEPA vacuum and collapse the bag completely. Remove the vacuum nozzle, seal the hole with duct tape, twist the bag tightly several times in the middle, and tape it to keep the material in the bottom during removal of the glove bag from the pipe.
  15. Slip a disposal bag over the glove bag (still attached to the pipe). Remove the tape securing the ends, and slit open the top of the glove bag and carefully fold it down into the disposal bag. Double bag and gooseneck waste materials.

**3.5.2 NEGATIVE PRESSURE GLOVEBAG PROCEDURE**

1. In addition to the above requirements, the HEPA vacuum shall be run continuously during the glovebag procedure until completion at which time the glovebag will be collapsed by the HEPA vacuum prior to removal from the pipe/component.
2. The HEPA vacuum shall be attached and operated as needed to prevent collapse of the glovebag during the removal process.

**3.6 LOCKDOWN ENCAPSULATION**

**3.6.1 GENERAL**

Lockdown encapsulation is an integral part of the ACM removal. At the conclusion of ACM removal and before removal of the primary barriers, all piping surfaces shall be encapsulated with a bridging encapsulant.

**3.6.2 SEALING EXPOSED EDGES**

Seal edges of ACM exposed by removal work with two coats of encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the encapsulant.

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**3.7 DISPOSAL OF ACM WASTE MATERIALS**

**3.7.1 GENERAL**

Dispose of waste ACM and debris which is packaged in accordance with these specifications, OSHA, EPA and DOT. The landfill requirements for packaging must also be met. Disposal shall be done at the approved landfill. Disposal of non-friable ACM shall be done in accordance with applicable regulations.

**3.7.2 PROCEDURES**

- A. Asbestos waste shall be packaged and moved through the W/EDF into a covered transport container in accordance with procedures in this specification. Waste shall be double-bagged prior to disposal. Wetted waste can be very heavy. Bags shall not be overfilled. Bags shall securely sealed to prevent accidental opening and/or leakage. The top shall be tightly twisted and goosenecked prior to tightly sealing with at least three wraps of duct tape. Ensure that unauthorized persons do not have access to the waste material once it is outside the regulated area. All transport containers must be covered at all times when not in use. NESHAP's signs must be on containers during loading and unloading. Material shall not be transported in open vehicles. If drums are used for packaging, the drums shall be labeled properly and shall not be re-used.
- B. Waste Load Out: Waste load out shall be done in accordance with the procedures in W/EDF Decontamination Procedures. Bags shall be decontaminated on exterior surfaces by wet cleaning and/or HEPA vacuuming before being placed in the second bag.
- C. Asbestos waste with sharp edged components, i.e., nails, screws, lath, strapping, tin sheeting, jacketing, metal mesh, etc., which might tear poly bags shall be wrapped securely in burlap before packaging and, if needed, use a poly lined fiber drum as the second container, prior to disposal.

**3.8 PROJECT DECONTAMINATION**

**3.8.1 GENERAL**

- A. The entire work related to project decontamination shall be performed under the close supervision and monitoring of the CPIH.
- B. If the asbestos abatement work is in an area which was contaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal and cleaning of the regulated area surfaces after the primary barrier removal.

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- C. If the asbestos abatement work is in an area which was uncontaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal, thus preventing contamination of the building when the regulated area critical barriers are removed.

**3.8.2 REGULATED AREA CLEARANCE**

Air testing and other requirements which must be met before release of the Contractor and re-occupancy of the regulated area space are specified in Final Testing Procedures.

**3.8.3 WORK DESCRIPTION**

Decontamination includes the cleaning and clearance of the air in the regulated area and the decontamination and removal of the enclosures/facilities installed prior to the abatement work including primary/critical barriers, PDF and W/EDF facilities.

**3.8.4 PRE-DECONTAMINATION CONDITIONS**

- A. Before decontamination starts, all ACM waste from the regulated area shall be removed, all waste collected and removed, and the secondary barrier of poly removed and disposed of along with any gross debris generated by the work.
- B. At the start of decontamination, the following shall be in place:
1. Critical barriers over all openings consisting of two layers of 6 mil poly which is the sole barrier between the regulated area and the rest of the building or outside.
  2. Decontamination facilities, if required for personnel and equipment in operating condition.

**3.8.5 FIRST CLEANING**

Carry out a first cleaning of all surfaces of the regulated area including items of remaining poly sheeting, tools, scaffolding, ladders/staging by wet methods and/or HEPA vacuuming. Do not use dry dusting/sweeping methods. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible residue from abated surfaces or poly or other surfaces. If determined by the CPIH/VPIH/CIH additional cleaning(s) may be needed.

**3.8.6 PRE-CLEARANCE INSPECTION AND TESTING**

The CPIH and VPIH/CIH will perform a thorough and detailed visual inspection after the first cleaning to determine whether there is any visible residue in the regulated area. If the visual inspection is



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acceptable, the CPIH will perform pre-clearance sampling using aggressive clearance as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A(III)(B)(7)(d). If the sampling results show values below 0.01 f/cc, then the Contractor shall notify the VA's representative of the results with a brief report from the CPIH documenting the inspection and sampling results and a statement verifying that the regulated area is ready for lockdown encapsulation. The VA reserves the right to utilize their own VPIH/CIH to perform a pre-clearance inspection and testing for verification.

**3.8.7 LOCKDOWN ENCAPSULATION OF ABATED SURFACES**

With the express written permission of the VA's representative, perform lockdown encapsulation of all surfaces from which asbestos was abated in accordance with the procedures in this specification.

**3.9 FINAL VISUAL INSPECTIONS AND AIR CLEARANCE TESTING**

**3.9.1 GENERAL**

Notify the VA representative 24 hours in advance for the performance of the final visual inspection and testing. The final visual inspection and testing will be performed by the VPIH/CIH after the final cleaning.

**3.9.2 FINAL VISUAL INSPECTION**

Final visual inspection will include the entire regulated area, the PDF, all poly sheeting, seals over HVAC openings, doorways, windows, and any other openings. If any debris, residue, dust or any other suspect material is detected, the final cleaning shall be repeated at no cost to the VA. Dust/material samples may be collected and analyzed at no cost to the VA at the discretion of the VPIH/CIH to confirm visual findings. When the regulated area is visually clean the final testing can be done.

**3.9.3 FINAL AIR CLEARANCE TESTING**

- A. After an acceptable final visual inspection by the VPIH/CIH and VA Representative, the VPIH/CIH will perform the final testing. Air samples will be collected and analyzed in accordance with procedures for PCM/TEM in this specification. If the release criteria are not met, the Contractor shall repeat the final cleaning and continue decontamination procedures. Additional inspection and testing will be done at the expense of the Contractor.
- B. If the results of the PCM/TEM are acceptable, remove the critical barriers. Any small quantities of residue material found upon removal of the poly shall be removed with a HEPA vacuum and localized isolation. If significant quantities are found as determined by the VPIH/CIH, then the

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entire area affected shall be cleaned as specified in the final cleaning.

- C. When release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

**3.9.4 FINAL AIR CLEARANCE PROCEDURES**

- A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc as measured with PCM/TEM methods.
- B. Air Monitoring and Final Clearance Sampling: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to the specified level, the VPIH/CIH will secure samples and analyze them according to the following procedures:
  - 1. Fibers Counted: "Fibers" referred to in this section shall be either all fibers regardless of composition as counted in the NIOSH 7400 PCM method or asbestos fibers counted using the TEM method.
  - 2. Aggressive Sampling: All final air testing samples shall be collected using aggressive sampling techniques. Samples will be collected on 0.8μ MCE filters for PCM analysis and 0.45μ Polycarbonate filters for TEM analysis. Before pumps are started, initiate aggressive sampling as detailed in 40 CFR 763 Subpart E (AHERA) Appendix A (III)(B)(7)(d). Air samples will be collected in areas subject to normal air circulation away from corners, obstructed locations, and locations near windows, doors, or vents. After air sampling pumps have been shut off, circulating fans shall be shut off.

**3.9.5 CLEARANCE SAMPLING USING PCM**

The NIOSH 7400 method will be used for clearance sampling with a minimum collection volume of 1200 Liters of air. A minimum of 5 PCM clearance samples will be collected.

**3.9.6 CLEARANCE SAMPLING USING TEM**

TEM clearance requires a minimum of 13 samples taken and analyzed, including five samples in the regulated area, five samples outside the regulated area and three field blanks using polycarbonate filters.

**3.9.7 LABORATORY TESTING OF PCM SAMPLES**

The services of an AIHA accredited laboratory will be employed by the VA to perform analysis of the air samples. Samples will be sent by the VPIH/CIH so that verbal/faxed reports can be received within 24 hours.

A complete record, certified by the laboratory, of all air monitoring

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tests and results will be furnished to the VA's representative and the Contractor.

**3.9.8 LABORATORY TESTING OF TEM SAMPLES**

Samples shall be sent by the VPIH/CIH to an accredited laboratory for analysis by TEM. Verbal/faxed results from the laboratory shall be available within 24 hours after receipt of the samples. A complete record, certified by the laboratory, of all TEM results shall be furnished to the VA's representative and the Contractor.

**3.10 ABATEMENT CLOSEOUT AND CERTIFICATE OF COMPLIANCE**

**3.10.1 COMPLETION OF ABATEMENT WORK**

After thorough decontamination, complete asbestos abatement work upon meeting the regulated area clearance criteria and fulfilling the following:

- A. Remove all equipment, materials, and debris from the project area.
- B. Package and dispose of all asbestos waste as required.
- C. Repair or replace all interior finishes damaged during the abatement work.
- D. Fulfill other project closeout requirements as specified elsewhere in this specification.

**3.10.2 CERTIFICATE OF COMPLETION BY CONTRACTOR**

The CPIH shall complete and sign the "Certificate of Completion" in accordance with Attachment 1 at the completion of the abatement and decontamination of the regulated area.

**3.10.3 WORK SHIFTS**

All work shall be done during administrative hours (8:00 AM to 4:30 PM) Monday - Friday excluding Federal Holidays. Any change in the work schedule must be approved in writing by the VA Representative.

**3.10.4 RE-INSULATION**

Replace all asbestos-containing insulation/fire-proofing with suitable non-asbestos material which is to remain and not be modified by the mechanical contractor. Provide SDS's for all replacement materials. Refer to Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.

**ATTACHMENT #1**

**CERTIFICATE OF COMPLETION**

DATE:

PROJECT NAME:

VA FACILITY/ADDRESS:

1. I certify that I have personally inspected, monitored and supervised the abatement work of  
(specify regulated area or Building):  
which took place from to.
2. That throughout the work all applicable requirements/regulations and the VA's specifications were met.
3. That any person who entered the regulated area was protected with the appropriate personal protective equipment and respirator and that they followed the proper entry and exit procedures and the proper operating procedures for the duration of the work.
4. That all employees of the Abatement Contractor engaged in this work were trained in respiratory protection, were experienced with abatement work, had proper medical surveillance documentation, were fit-tested for their respirator, and were not exposed at any time during the work to asbestos without the benefit of appropriate respiratory protection.
5. That I performed and supervised all inspection and testing specified and required by applicable regulations and VA specifications.
6. That the conditions inside the regulated area were always maintained in a safe and healthy condition and the maximum fiber count never exceeded 0.5 f/cc, except as described below.
7. That all glovebag work was done in accordance with OSHA requirements and the manufacturer's recommendations.

CPIH Name:

Signature/Date:

Asbestos Abatement Contractor's Name:

Signature/Date:

**ATTACHMENT #2**

**CERTIFICATE OF WORKER'S ACKNOWLEDGMENT**

DATE:

PROJECT NAME:

PROJECT ADDRESS:

ABATEMENT CONTRACTOR'S NAME:

**WORKING WITH ASBESTOS CAN BE HAZARDOUS TO YOUR HEALTH. INHALING ASBESTOS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCERS. IF YOU SMOKE AND INHALE ASBESTOS FIBERS YOUR CHANCES OF DEVELOPING LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.**

Your employer's contract with the owner for the above project requires that: You must be supplied with the proper personal protective equipment including an adequate respirator and be trained in its use. You must be trained in safe and healthy work practices and in the use of the equipment found at an asbestos abatement project. You must receive/have a current medical examination for working with asbestos. These things shall be provided at no cost to you. By signing this certificate you are indicating to the owner that your employer has met these obligations.

**RESPIRATORY PROTECTION:** I have been trained in the proper use of respirators and have been informed of the type of respirator to be used on the above indicated project. I have a copy of the written Respiratory Protection Program issued by my employer. I have been provided for my exclusive use, at no cost, with a respirator to be used on the above indicated project.

**TRAINING COURSE:** I have been trained by a third party, State/EPA accredited trainer in the requirements for an AHERA/OSHA Asbestos Abatement Worker training course, 32 hours minimum duration. I currently have a valid State accreditation certificate. The topics covered in the course include, as a minimum, the following:

- Physical Characteristics and Background Information on Asbestos
- Potential Health Effects Related to Exposure to Asbestos
- Employee Personal Protective Equipment
- Establishment of a Respiratory Protection Program
- State of the Art Work Practices
- Personal Hygiene
- Additional Safety Hazards
- Medical Monitoring
- Air Monitoring
- Relevant Federal, State and Local Regulatory Requirements, Procedures, and Standards
- Asbestos Waste Disposal

**MEDICAL EXAMINATION:** I have had a medical examination within the past 12 months which was paid for by my employer. This examination included: health history, occupational history, pulmonary function test, and may have included a chest x-ray evaluation. The physician issued a positive written opinion after the examination.

Signature:

Printed Name:

Witness:

**ATTACHMENT #3**

**AFFIDAVIT OF MEDICAL SURVEILLANCE, RESPIRATORY PROTECTION AND  
TRAINING/ACCREDITATION**

VA PROJECT NAME AND NUMBER:

VA MEDICAL FACILITY:

ABATEMENT CONTRACTOR'S NAME AND ADDRESS:

1. I verify that the following individual

Name:

who is proposed to be employed in asbestos abatement work associated with the above project by the named Abatement Contractor, is included in a medical surveillance program in accordance with 29 CFR 1926.1101(m), and that complete records of the medical surveillance program as required by 29 CFR 1926.1101(m)(n) and 29 CFR 1910.20 are kept at the offices of the Abatement Contractor at the following address.

Address:

2. I verify that this individual has been trained, fit-tested and instructed in the use of all appropriate respiratory protection systems and that the person is capable of working in safe and healthy manner as expected and required in the expected work environment of this project.
3. I verify that this individual has been trained as required by 29 CFR 1926.1101(k). This individual has also obtained a valid State accreditation certificate. Documentation will be kept on-site.
4. I verify that I meet the minimum qualifications criteria of the VA specifications for a CPIH.

Signature of CPIH:

Date:

Printed Name of CPIH:

Signature of Contractor:

Date:

Printed Name of Contractor:

**ATTACHMENT #4**

ABATEMENT CONTRACTOR/COMPETENT PERSON(S) REVIEW AND ACCEPTANCE OF THE  
VA'S ASBESTOS SPECIFICATIONS

VA Project Location:

VA Project #:

VA Project Description:

This form shall be signed by the Asbestos Abatement Contractor Owner and the Asbestos Abatement Contractor's Competent Person(s) prior to any start of work at the VA related to this Specification. If the Asbestos Abatement Contractor's/Competent Person(s) has not signed this form, they shall not be allowed to work on-site.

I, the undersigned, have read VA's Asbestos Specification regarding the asbestos abatement requirements. I understand the requirements of the VA's Asbestos Specification and agree to follow these requirements as well as all required rules and regulations of OSHA/EPA/DOT and State/Local requirements. I have been given ample opportunity to read the VA's Asbestos Specification and have been given an opportunity to ask any questions regarding the content and have received a response related to those questions. I do not have any further questions regarding the content, intent and requirements of the VA's Asbestos Specification.

At the conclusion of the asbestos abatement, I will certify that all asbestos abatement work was done in accordance with the VA's Asbestos Specification and all ACM was removed properly and no fibrous residue remains on any abated surfaces.

Abatement Contractor Owner's Signature \_\_\_\_\_ Date \_\_\_\_\_

Abatement Contractor Competent Person(s)	Date
------------------------------------------	------

Date \_\_\_\_\_

Date \_\_\_\_\_

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**SECTION 02 82 13.19**  
**ASBESTOS FLOOR TILE AND MASTIC ABATEMENT**

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**PART 1 - GENERAL**

**1.1 CONTRACT DOCUMENTS AND RELATED REQUIREMENTS**

Drawings, general provisions of the contract, including general and supplementary conditions and other Division 01 specifications, shall apply to the work of this section. The contract documents show the work to be done under the contract and related requirements and conditions impacting the project. Related requirements and conditions include applicable codes and regulations, notices and permits, existing site conditions and restrictions on use of the site, requirements for partial owner occupancy during the work, coordination with other work and the phasing of the work. In the event the Asbestos Abatement Contractor (Contractor) discovers a conflict in the contract documents and/or requirements or codes, the conflict must be brought to the immediate attention of the Contracting Officer for resolution. Whenever there is a conflict or overlap in the requirements, the most stringent shall apply. Any actions taken by the Contractor without obtaining guidance from the Contracting Officer shall become the sole risk and responsibility of the Contractor. All cost incurred due to such action are also the responsibility of the Contractor.

**1.2 EXTENT OF WORK**

- A. Below is a brief description of the estimated quantities of asbestos flooring materials to be abated. These quantities are for informational purposes only and are based on the best information available at the time of the specification preparation. The Contractor shall satisfy himself as the actual quantities to be abated. Nothing in this section may be interpreted as limiting the extent of work otherwise required by this contract and related documents.
- B. Removal, clean-up and disposal of ACM flooring in an appropriate regulated area in the following approximate quantities;
  - ( 158 ) square meters (1,700 sf) of drywall & joint compound - MDWC-1
  - ( 80 ) square meters (860 sf) of floor tile & mastic - MF12-1, MF12-2 & MF9-1

**1.3 RELATED WORK**

- A. Section 07 84 00, FIRESTOPPING.
- B. Section 02 41 00, DEMOLITION.
- C. Division 09; FINISHES.

**1.4 TASKS**

The work tasks are summarized briefly as follows:

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- A. Pre-abatement activities including pre-abatement meeting(s), inspection(s), notifications, permits, submittal approvals, work-site preparations, emergency procedures arrangements, and standard operating procedures for Class II asbestos abatement work.
- B. Abatement activities including removal, clean-up and disposal of ACM waste, recordkeeping, security, monitoring, and inspections.
- C. Cleaning and decontamination activities including final visual inspection, air monitoring and certification of decontamination.

**1.5 ABATEMENT CONTRACTOR USE OF PREMISES**

- A. The Contractor and Contractor's personnel shall cooperate fully with the VA representative/consultant to facilitate efficient use of buildings and areas within buildings. The Contractor shall perform the work in accordance with the VA specifications, drawings, phasing plan and in compliance with any/all applicable Federal, State and Local regulations and requirements.
- B. The Contractor shall use the existing facilities in the building strictly within the limits indicated in contract documents as well as the approved pre-abatement work plan. Asbestos abatement drawings of partially occupied buildings will show the limits of regulated areas; the placement of decontamination facilities; the temporary location of bagged waste ACM; the path of transport to outside the building; and the temporary waste storage area for each building/regulated area. Any variation from the arrangements shown on drawings shall be secured in writing from the VA representative through the pre-abatement plan of action. The following limitations of use shall apply to existing facilities shown on drawings:

Reference Section 028211-A, the asbestos inspection report, "Limited Pre-Renovation Asbestos Inspection Report: Re-Purpose C-Section Basement Pool & Electrical Room Project, VA Project #578-15-026, Edward Hines, JR., Veterans Administration Hospital, Hines, IL", prepared by The Sigma Group, Inc.

**1.6 VARIATIONS IN QUANTITY**

The quantities and locations of ACM as indicated on the drawings and the extent of work included in this section are estimates which are limited by the physical constraints imposed by occupancy of the buildings. Accordingly, minor variations (+/- 5%) in quantities of ACM within the regulated area are considered as having no impact on contract price and

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time requirements of this contract. Where additional work is required beyond the above variation, the Contractor shall provide unit prices for additional work that is newly discovered materials and those prices will be used for additional work under the contract.

Additionally, it may be later determined that materials designated as Assumed to Contain (ATC) do not contain greater than one percent asbestos. As such, the contractor shall provide unit pricing for all materials designated as POS and ATC. Materials designated as ATC which are later determined to contain less than one percent asbestos may be removed from the contract at the discretion of the owner. The dollar amount deducted from the contract will be determined by multiplying the quantity of ATC materials determined to be non-ACM by the unit costs.

**1.7 STOP ASBESTOS REMOVAL**

If the Contracting Officer or their field representative presents a written **Stop Asbestos Removal Order**, the Contractor/Personnel shall immediately stop all asbestos removal and adequately wet any exposed ACM. The Contractor shall not resume any asbestos removal activity until authorized to do so by the VA. A stop asbestos removal order may be issued at any time the VA determines abatement conditions/ activities are not within specification requirements. Work stoppage will continue until conditions have been corrected to the satisfaction of the VA. Standby time and costs for corrective actions will be borne by the Contractor, including the industrial hygienist's time. The occurrence of any of the following events shall be reported immediately by the Contractor in writing to the VA representative and shall require the Contractor to immediately stop asbestos removal activities and initiate fiber reduction activities:

- A.  $\geq 0.01$  f/cc outside a regulated area or  $>0.05$  f/cc inside a regulated area;
- B. breach/break in regulated area critical barrier(s)/floor;
- C. serious injury/death at the site;
- D. fire/safety emergency at the site;
- E. respiratory protection system failure;
- F. power failure loss of wetting agent; or
- G. any visible emissions observed outside the regulated area.

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## 1.8 GENERAL

Definitions and explanations here are neither complete nor exclusive of all terms used in the contract documents, but are general for the work to the extent they are not stated more explicitly in another element of the contract documents. Drawings must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated therein.

## 1.9 GLOSSARY

**Abatement** - Procedures to control fiber release from asbestos-containing materials, typically during removal. Includes removal, encapsulation, enclosure, demolition and renovation activities related to asbestos.

**ACE** - Asbestos contaminated elements.

**ACM** - Asbestos-containing material.

**Aerosol** - Solid or liquid particulate suspended in air.

**Adequately wet** - Sufficiently mixed or penetrated with liquid to prevent the release of particulates. If visible emissions are observed coming from the ACM, then that material has not been adequately wetted.

**Aggressive method** - Removal or disturbance of building material by sanding, abrading, grinding, or other method that breaks, crumbles, or disintegrates intact ACM.

**Aggressive sampling** - EPA AHERA defined clearance sampling method using air moving equipment such as fans and leaf blowers to aggressively disturb and maintain in the air residual fibers after abatement.

**AHERA** - Asbestos Hazard Emergency Response Act. Asbestos regulations for schools issued in 1987.

**Aircell** - Pipe or duct insulation made of corrugated cardboard which contains asbestos.

**Air monitoring** - The process of measuring the fiber content of a known volume of air collected over a specified period of time. The NIOSH 7400 Method, Issue 2 is used to determine the fiber levels in air.

**Air sample filter** - The filter used to collect fibers which are then counted. The filter is made of mixed cellulose ester membrane for PCM (Phase Contrast Microscopy) and polycarbonate for TEM (Transmission Electron Microscopy)

**Amended water** - Water to which a surfactant (wetting agent) has been added to increase the penetrating ability of the liquid.

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**Asbestos** - Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated or altered. Asbestos also includes PACM, as defined below.

**Asbestos-containing material (ACM)** - Any material containing more than one percent asbestos.

**Asbestos contaminated elements (ACE)** - Building elements such as ceilings, walls, lights, or ductwork that are contaminated with asbestos.

**Asbestos-containing waste material** - Asbestos-containing material or asbestos contaminated objects requiring disposal.

**Asbestos waste decontamination facility** - A system consisting of drum/bag washing facilities and a temporary storage area for cleaned containers of asbestos waste. Used as the exit for waste and equipment leaving the regulated area. In an emergency, it may be used to evacuate personnel.

**Authorized person** - Any person authorized by the VA, the Contractor, or government agency and required by work duties to be present in regulated areas.

**Authorized visitor** - Any person approved by the VA; the contractor; or any government agency having jurisdiction over the regulated area.

**Barrier** - Any surface that isolates the regulated area and inhibits fiber migration from the regulated area.

**Containment Barrier** - An airtight barrier consisting of walls, floors, and/or ceilings of sealed plastic sheeting which surrounds and seals the outer perimeter of the regulated area.

**Critical Barrier** - The barrier responsible for isolating the regulated area from adjacent spaces, typically constructed of plastic sheeting secured in place at openings such as doors, windows, or any other opening into the regulated area.

**Primary Barrier** - Barriers placed over critical barriers and exposed directly to abatement work.

**Secondary Barrier** - Any additional sheeting used to isolate and provide protection from debris during abatement work.

**Breathing zone** - The hemisphere forward of the shoulders with a radius of about 150 - 225 mm (6 - 9 inches) from the worker's nose.

**Bridging encapsulant** - An encapsulant that forms a layer on the surface of the ACM.

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**Building/facility owner** - The legal entity, including a lessee, which exercises control over management and recordkeeping functions relating to a building and/or facility in which asbestos activities take place.

**Bulk testing** - The collection and analysis of suspect asbestos containing materials.

**Certified Industrial Hygienist (CIH)** - One certified in practice of industrial hygiene by the American Board of Industrial Hygiene. An industrial hygienist Certified in Comprehensive Practice by the American Board of Industrial Hygiene.

**Class I asbestos work** - Activities involving the removal of Thermal System Insulation (TSI) and surfacing ACM and Presumed Asbestos Containing Material (PACM).

**Class II asbestos work** - Activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic.

**Clean room/Changing room** - An uncontaminated room having facilities for the storage of employee's street clothing and uncontaminated materials and equipment.

**Clearance sample** - The final air sample taken after all asbestos work has been done and visually inspected.

Performed by the VA's industrial hygiene consultant (VPIH).

**Closely resemble** - The major workplace conditions which have contributed to the levels of historic asbestos exposure, are no more protective than conditions of the current workplace.

**Competent person** - In addition to the definition in 29 CFR 1926.32(f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f); in addition, for Class I and II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor.

**Contractor's Professional Industrial Hygienist (CPIH)** - The Contractor's industrial hygienist. The industrial hygienist must meet the qualification requirements of the PIH.



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**Count** - Refers to the fiber count or the average number of fibers greater than five microns in length per cubic centimeter of air.

**Decontamination area/unit** - An enclosed area adjacent to and connected to the regulated area and consisting of an equipment room, shower room, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

**Demolition** - The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

**Disposal bag** - Typically 6 mil thick siftproof, dustproof, leak-tight container used to package and transport asbestos waste from regulated areas to the approved landfill. Each bag/container must be labeled/marked in accordance with EPA, OSHA and DOT requirements.

**Disturbance** - Activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM or PACM, no greater than the amount that can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or disposal bag which shall not exceed 60 inches in length or width.

**Drum** - A rigid, impermeable container made of cardboard fiber, plastic, or metal which can be sealed in order to be siftproof, dustproof, and leak-tight.

**Employee exposure** - The exposure to airborne asbestos that would occur if the employee were not wearing respiratory protection equipment.

**Encapsulant** - A material that surrounds or embeds asbestos fibers in an adhesive matrix and prevents the release of fibers.

**Encapsulation** - Treating ACM with an encapsulant.

**Enclosure** - The construction of an air tight, impermeable, permanent barrier around ACM to control the release of asbestos fibers from the material and also eliminate access to the material.

**Equipment room** - A contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

**Fiber** - A particulate form of asbestos, 5 microns or longer, with a length to width ratio of at least 3 to 1.

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**Fibers per cubic centimeter (f/cc)** - Abbreviation for fibers per cubic centimeter, used to describe the level of asbestos fibers in air.

**Filter** - Media used in respirators, vacuums, or other machines to remove particulate from air.

**Firestopping** - Material used to close the open parts of a structure in order to prevent a fire from spreading.

**Friable asbestos containing material** - Any material containing more than 1 percent asbestos as determined using the method specified in Appendix A, Subpart F, 40 CFR 763, Section 1, Polarized Light Microscopy, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

**Glovebag** - Not more than a 60 x 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which materials and tools may be handled.

**High efficiency particulate air (HEPA) filter** - A filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 microns or greater in diameter.

**HEPA vacuum** - Vacuum collection equipment equipped with a HEPA filter system capable of collecting and retaining asbestos fibers.

**Homogeneous area** - An area of surfacing, thermal system insulation or miscellaneous ACM that is uniform in color, texture and date of application.

**HVAC** - Heating, Ventilation and Air Conditioning

**Industrial hygienist** - A professional qualified by education, training, and experience to anticipate, recognize, evaluate and develop controls for occupational health hazards. Meets definition requirements of the American Industrial Hygiene Association (AIHA).

**Industrial hygienist technician** - A person working under the direction of an IH or CIH who has special training, experience, certifications and licenses required for the industrial hygiene work assigned.

**Intact** - The ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

**Lockdown** - Applying encapsulant, after a final visual inspection, on all abated surfaces at the conclusion of ACM removal prior to removal of critical barriers.

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**National Emission Standards for Hazardous Air Pollutants (NESHAP's)** - EPA's rule to control emissions of asbestos to the environment.

**Negative initial exposure assessment** - A demonstration by the employer which complies with the criteria in 29 CFR 1926.1101 (f)(2)(iii), that employee exposure during an operation is expected to be consistently below the PEL's.

**Negative pressure** - Air pressure which is lower than the surrounding area, created by exhausting air from a sealed regulated area through HEPA equipped filtration units. OSHA requires maintaining -0.02" water gauge inside the negative pressure enclosure.

**Negative pressure respirator** - A respirator in which the air pressure inside the facepiece is negative during inhalation relative to the air outside the respirator.

**Non-friable ACM** - Material that contains more than 1 percent asbestos but cannot be crumbled, pulverized, or reduced to powder by hand pressure.

**Organic vapor cartridge** - The type of cartridge used on air purifying respirators for organic vapor exposures.

**Outside air** - The air outside buildings and structures, including, but not limited to, the air under a bridge or in an open ferry dock.

**Owner/operator** - Any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

**Penetrating encapsulant** - Encapsulant that is absorbed into the ACM matrix without leaving a surface layer.

**Personal sampling/monitoring** - Representative air samples obtained in the breathing zone of the person using a cassette and battery operated pump to determine asbestos exposure.

**Permissible exposure limit (PEL)** - The level of exposure OSHA allows for an 8 hour time weighted average. For asbestos fibers, the PEL is 0.1 fibers per cc.

**Polarized light microscopy (PLM)** - Light microscopy using dispersion staining techniques and refractive indices to identify and quantify the type(s) of asbestos present in a bulk sample.

**Polyethylene sheeting** - Strong plastic barrier material 4 to 6 mils thick, semi-transparent, sometimes flame retardant in compliance with NFPA 241.

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**Positive/negative fit check** - A method of verifying the fit of a respirator by closing off the filters and breathing in or closing off the exhalation valve and breathing out while detecting leakage of the respirator.

**Presumed ACM (PACM)** - Thermal system insulation, surfacing, and flooring material installed in buildings prior to 1981. If the building owner has actual knowledge, or should have known through the exercise of due diligence that other materials are ACM, they too must be treated as PACM. The designation of PACM may be rebutted pursuant to 29 CFR 1926.1101 (k)(5).

**Professional IH** - An IH who meets the definition requirements of AIHA; meets the definition requirements of OSHA as a "Competent Person" at 29 CFR 1926.1101 (b); has completed two specialized EPA approved courses on management and supervision of asbestos abatement projects; has formal training in respiratory protection and waste disposal; and has a minimum of four projects of similar complexity with this project of which at least three projects serving as the supervisory IH.

**Project designer** - A person who has successfully completed the training requirements for an asbestos abatement project designer as required by 40 CFR 763 Appendix C, Part I; (B)(5).

**Protection factor** - A value assigned by OSHA/NIOSH to indicate the assigned protection a respirator should provide if worn properly. The number indicates the reduction of exposure level from outside to inside the respirator.

**Qualitative fit test (QLFT)** - A fit test using a challenge material that can be sensed by the wearer if leakage in the respirator occurs.

**Quantitative fit test (QNFT)** - A fit test using a challenge material which is quantified outside and inside the respirator thus allowing the determination of the actual fit factor.

**Regulated area** - An area established by the employer to demarcate where Class I, II, III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work may accumulate; and a work area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed the PEL.

**Regulated ACM (RACM)** - Friable ACM; Category I nonfriable ACM that has become friable; Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading or; Category II nonfriable ACM that has a high probability of becoming or has become

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crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of the demolition or renovation operation.

**Removal** - All operations where ACM, PACM and/or RACM is taken out or stripped from structures or substrates, including demolition operations.

**Renovation** - Altering a facility or one or more facility components in any way, including the stripping or removal of asbestos from a facility component which does not involve demolition activity.

**Repair** - Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.

**Shower room** - The portion of the PDF where personnel shower before leaving the regulated area. Also used for bag/drum decontamination in the EDF.

**Standard operating procedures (SOP's)** - Asbestos work procedures required to be submitted by the contractor before work begins.

**Supplied air respirator (SAR)** - A respirator that utilizes an air supply separate from the air in the regulated area.

**Surfacing ACM** - A material containing more than 1 percent asbestos that is sprayed, troweled on or otherwise applied to surfaces for acoustical, fireproofing and other purposes.

**Surfactant** - A chemical added to water to decrease water's surface tension thus making it more penetrating into ACM.

**Thermal system ACM** - A material containing more than 1 percent asbestos applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain.

**Transmission electron microscopy (TEM)** - A microscopy method that can identify and count asbestos fibers.

**VA Industrial Hygienist (VPIH/CIH)** - Department of Veterans Affairs Professional Industrial Hygienist.

**VA Representative** - The VA official responsible for on-going project work.

**Visible emissions** - Any emissions, which are visually detectable without the aid of instruments, coming from ACM/PACM/RACM or ACM waste material.

**Waste/Equipment decontamination area (W/EDA)** - The area in which waste is packaged and equipment is decontaminated before removal from the regulated area.

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**Waste generator** - Any owner or operator whose act or process produces asbestos-containing waste material.

**Waste shipment record** - The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

**Wet cleaning** - The process of thoroughly eliminating, by wet methods, any asbestos contamination from surfaces or objects.

**1.10 REFERENCED STANDARDS ORGANIZATIONS**

The following acronyms or abbreviations as referenced in contract/specification documents are defined to mean the associated names. Names and addresses may be subject to change.

- A. VA Department of Veterans Affairs  
810 Vermont Avenue, NW  
Washington, DC 20420
- B. AIHA American Industrial Hygiene Association  
2700 Prosperity Avenue, Suite 250  
Fairfax, VA 22031  
703-849-8888
- C. ANSI American National Standards Institute  
1430 Broadway  
New York, NY 10018  
212-354-3300
- D. ASTM American Society for Testing and Materials  
1916 Race St.  
Philadelphia, PA 19103  
215-299-5400
- E. CFR Code of Federal Regulations  
Government Printing Office  
Washington, DC 20420
- F. CGA Compressed Gas Association  
1235 Jefferson Davis Highway  
Arlington, VA 22202  
703-979-0900
- G. CS Commercial Standard of the National Institute of Standards and Technology (NIST)  
U. S. Department of Commerce  
Government Printing Office  
Washington, DC 20420

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- H. EPA Environmental Protection Agency  
401 M St., SW  
Washington, DC 20460  
202-382-3949
- I. MIL-STD Military Standards/Standardization Division  
Office of the Assistant Secretary of Defense  
Washington, DC 20420
- J. MSHA Mine Safety and Health Administration  
Respiratory Protection Division  
Ballston Tower #3  
Department of Labor  
Arlington, VA 22203  
703-235-1452
- K. NIST National Institute for Standards and Technology  
U. S. Department of Commerce  
Gaithersburg, MD 20234  
301-921-1000
- L. NEC National Electrical Code (by NFPA)
- M. NEMA National Electrical Manufacturer's Association  
2101 L Street, NW  
Washington, DC 20037
- N. NFPA National Fire Protection Association  
1 Batterymarch Park  
P.O. Box 9101  
Quincy, MA 02269-9101  
800-344-3555
- O. NIOSH National Institutes for Occupational Safety and Health  
4676 Columbia Parkway  
Cincinnati, OH 45226  
513-533-8236
- P. OSHA Occupational Safety and Health Administration  
U.S. Department of Labor  
Government Printing Office  
Washington, DC 20402
- Q. UL Underwriters Laboratory  
333 Pfingsten Rd.  
Northbrook, IL 60062  
312-272-8800

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R. USA United States Army

Army Chemical Corps

Department of Defense

Washington, DC 20420

**1.11 GENERAL APPLICABILITY OF CODES, REGULATIONS, AND STANDARDS**

- A. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.
- B. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements or with these specifications exists, the most stringent requirement(s) shall be utilized.
- C. Copies of all standards, regulations, codes and other applicable documents, including this specification and those listed in Section 1.5 shall be available at the worksite in the clean change area of the worker decontamination system.

**1.12 CONTRACTOR RESPONSIBILITY**

The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to any and all aspects of the abatement project. The Contractor is responsible for providing and maintaining training, accreditations, medical exams, medical records, personal protective equipment as required by applicable Federal, State and Local regulations. The contractor shall hold the VA and VPIH/CIH consultants harmless for any failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental requirement on the part of himself, his employees, or his subcontractors. The contractor will incur all costs of the CPIH, including all sampling/analytical costs to assure compliance with OSHA/EPA/State requirements.

**1.13 FEDERAL REQUIREMENTS**

Federal requirements which govern some aspect of asbestos abatement include, but are not limited to, the following regulations.

- A. Occupational Safety and Health Administration (OSHA)
  - 1. Title 29 CFR 1926.1101 - Construction Standard for Asbestos
  - 2. Title 29 CFR 1910.132 - Personal Protective Equipment



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3. Title 29 CFR 1910.134 - Respiratory Protection
4. Title 29 CFR 1926 - Construction Industry Standards
5. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
6. Title 29 CFR 1910.1200 - Hazard Communication
7. Title 29 CFR 1910.151 - Medical and First Aid
- B. Environmental Protection Agency (EPA)
  1. 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.
  2. 40 CFR 763.80 - Asbestos Hazard Emergency Response Act (AHERA)
- C. Department of Transportation (DOT)
  1. Title 49 CFR 100 - 185 - Transportation

**1.14 STATE REQUIREMENTS**

State requirements that apply to the asbestos abatement work, disposal, clearance, etc., include, but are not limited to, the following:

- A. Illinois Administrative Code Part 228
- B. Illinois Department of Public Health 225 ILCS 207

**1.15 STANDARDS**

- A. Standards which govern asbestos abatement activities include, but are not limited to, the following:
  1. American National Standards Institute (ANSI) Z9.2-2012 - Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems
  2. ANSI Z88.2 - Practices for Respiratory Protection.
  3. Underwriters Laboratories (UL) 586-90 - UL Standard for Safety of HEPA filter Units, 7th Edition.
- B. Standards which govern encapsulation work include, but are not limited to, the following:
  1. American Society for Testing and Materials (ASTM)
- C. Standards which govern the fire and safety concerns in abatement work include, but are not limited to, the following:
  1. National Fire Protection Association (NFPA) 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
  2. NFPA 701 - Standard Methods for Fire Tests for Flame Resistant Textiles and Film.
  3. NFPA 101 - Life Safety Code
- D. Resilient Floor Covering Institute (RFCI):

Recommended work practices for Removal of Resilient Floor Coverings.

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**1.16 EPA GUIDANCE DOCUMENTS**

- A. EPA guidance documents which discuss asbestos abatement work activities are listed below. These documents are made part of this section by reference. EPA publications can be ordered from (800) 424-9065.
- B. Guidance for Controlling ACM in Buildings (Purple Book) EPA 560/5-85-024
- C. Asbestos Waste Management Guidance EPA 530-SW-85-007
- D. A Guide to Respiratory Protection for the Asbestos Abatement Industry EPA-560-OPTS-86-001
- E. Guide to Managing Asbestos in Place (Green Book) TS 799 20T July 1990

**1.17 NOTICES**

- A. State and Local agencies: Send written notification as required by state and local regulations including the local fire department prior to beginning any work on ACM as follows:
- B. Copies of notifications shall be submitted to the VA for the facility's records in the same time frame notification is given to EPA, State, and Local authorities.

**1.18 PERMITS/LICENSES**

- A. The contractor shall apply for and have all required permits and licenses to perform asbestos abatement work as required by Federal, State, and Local regulations.

**1.19 POSTING AND FILING OF REGULATIONS**

- A. Maintain two (2) copies of applicable federal, state, and local regulations. Post one copy of each at the regulated area where workers will have daily access to the regulations and keep another copy in the Contractor's office.

**1.20 VA RESPONSIBILITIES**

Prior to commencement of work:

- A. Notify occupants adjacent to regulated areas of project dates and requirements for relocation, if needed. Arrangements must be made prior to starting work for relocation of desks, files, equipment and personal possessions to avoid unauthorized access into the regulated area. **Note: Notification of adjacent personnel is required by OSHA in 29 CFR 1926.1101 (k) to prevent unnecessary or unauthorized access to the regulated area.**
- B. Submit to the Contractor results of background air sampling; including location of samples, person who collected the samples, equipment utilized and method of analysis. During abatement, submit to the Contractor, results of bulk material analysis and air sampling data

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collected during the course of the abatement. This information shall not release the Contractor from any responsibility for OSHA compliance.

**1.21 SITE SECURITY**

- A. Regulated area access is to be restricted only to authorized, trained/accredited and protected personnel. These may include the Contractor's employees, employees of Subcontractors, VA employees and representatives, State and local inspectors, and any other designated individuals. A list of authorized personnel shall be established prior to commencing the project and be posted in the clean room of the decontamination unit.
- B. Entry into the regulated area by unauthorized individuals shall be reported immediately to the Competent Person by anyone observing the entry. The Competent person shall immediately notify the VA.
- C. A log book shall be maintained in the clean room of the decontamination unit. Anyone who enters the regulated area must record their name, affiliation, time in, and time out for each entry.
- D. Access to the regulated area shall be through of a critical barrier doorway. All other access (doors, windows, hallways, etc.) shall be sealed or locked to prevent entry to or exit from the regulated area. The only exceptions for this requirement are the waste/equipment load-out area which shall be sealed except during the removal of containerized asbestos waste from the regulated area, and emergency exits. Emergency exits shall not be locked from the inside, however, they shall be sealed with poly sheeting and taped until needed.
- E. The Contractor's Competent Person shall control site security during abatement operations in order to isolate work in progress and protect adjacent personnel. A 24 hour security system shall be provided at the entrance to the regulated area to assure that all entrants are logged in/out and that only authorized personnel are allowed entrance.
- F. The Contractor will have the VA's assistance in notifying adjacent personnel of the presence, location and quantity of ACM in the regulated area and enforcement of restricted access by the VA's employees.
- G. The regulated area shall be locked during non-working hours and secured by VA security guards.

**1.22 EMERGENCY ACTION PLAN AND ARRANGEMENTS**

- A. An Emergency Action Plan shall be developed by the Contractor prior to commencing abatement activities and shall be agreed to by the Contractor

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and the VA. The Plan shall meet the requirements of 29 CFR 1910.38 (a);(b).

- B. Emergency procedures shall be in written form and prominently posted and available in the regulated area. Everyone, prior to entering the regulated area, must read and sign these procedures to acknowledge understanding of the regulated area layout, location of emergency exits and emergency procedures.
- C. Emergency planning shall include written notification of police, fire, and emergency medical personnel of planned abatement activities; work schedule and layout of regulated area, particularly barriers that may affect response capabilities.
- D. Emergency planning shall include consideration of fire, explosion, hazardous atmospheres, electrical hazards, slips/trips and falls, confined spaces, and heat stress illness. Written procedures for response to emergency situations shall be developed and employee training in procedures shall be provided.
- E. Employees shall be trained in regulated area/site evacuation procedures in the event of workplace emergencies.
  - 1. For non life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the regulated area to obtain proper medical treatment.
  - 2. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the regulated area, and secure proper medical treatment.
- F. Telephone numbers of all emergency response personnel shall be prominently posted in the clean room, along with the location of the nearest telephone.
- G. The Contractor shall provide verification of first aid/CPR training for personnel responsible for providing first aid/CPR. OSHA requires medical assistance within 3 minutes of a life-threatening injury/illness. Bloodborne Pathogen training shall also be verified for those personnel required to provide first aid/CPR.
- H. The Emergency Action Plan shall provide for a Contingency Plan in the event that an incident occurs that may require the modification of the standard operating procedures during abatement. Such incidents include, but are not limited to, fire; accident; and power failure. The

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Contractor shall detail procedures to be followed in the event of an incident assuring that work is stopped and wetting is continued until correction of the problem.

**1.23 PRE-START MEETING**

Prior to commencing the work, the Contractor shall meet with the VPCIH to present and review, as appropriate, the items following this paragraph. The Contractor's Competent Person(s) who will be on-site shall participate in the pre-start meeting. The pre-start meeting is to discuss and determine procedures to be used during the project. At this meeting, the Contractor shall provide:

- A. Proof of Contractor licensing.
- B. Proof the Competent Person is trained and accredited and approved for working in this State. Verification of the experience of the Competent Person shall also be presented.
- C. A list of all workers who will participate in the project, including experience and verification of training and accreditation.
- D. A list of and verification of training for all personnel who have current first-aid/CPR training. A minimum of one person per shift must have adequate training.
- E. Current medical written opinions for all personnel working on-site meeting the requirements of 29 CFR 1926.1101 (m).
- F. Current fit-tests for all personnel wearing respirators on-site meeting the requirements of 29 CFR 1926.1101 (h) and Appendix C.
- G. A copy of the Contractor's Standard Operating Procedures for Class I Glovebag Asbestos Abatement. In these procedures, the following information must be detailed, specific for this project.
  - 1. Regulated area preparation procedures;
  - 2. Notification requirements procedure of Contractor as required in 29 CFR 1926.1101 (d);
  - 3. and Decontamination procedures for employees;
  - 4. Class II abatement methods/procedures and equipment to be used;
  - 5. Personal protective equipment to be used;
- H. At this meeting the Contractor shall provide all submittals as required.
- I. Procedures for handling, packaging and disposal of asbestos waste.
- J. Emergency Action Plan and Contingency Plan procedures.

**1.24 PROJECT COORDINATION**

The following are the minimum administrative and supervisory personnel necessary for coordination of the work.

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**1.25 PERSONNEL**

- A. Administrative and supervisory personnel shall consist of a qualified Competent Person as defined by OSHA in the Construction Standards and the Asbestos Construction Standard; Contractor Professional Industrial Hygienist and Industrial Hygiene Technicians. These employees are the Contractor's representatives responsible for compliance with these specifications and all other applicable requirements.
- B. Non-supervisory personnel shall consist of an adequate number of qualified personnel to meet the schedule requirements of the project. Personnel shall meet required qualifications. Personnel utilized on-site shall be pre-approved by the VA representative. A request for approval shall be submitted for any person to be employed during the project giving the person's name; qualifications; accreditation card with picture; Certificate of Worker's Acknowledgment; and Affidavit of Medical Surveillance and Respiratory Protection and current Respirator Fit Test.
- C. Minimum qualifications for Contractor and assigned personnel are:
  - 1. The Contractor has conducted within the last three (3) years, three (3) projects of similar complexity and dollar value as this project; has not been cited and penalized for serious violations of asbestos regulations in the past three (3) years; has adequate liability/occurrence insurance for asbestos work; is licensed in applicable states; has adequate and qualified personnel available to complete the work; has comprehensive standard operating procedures for asbestos work; has adequate materials, equipment and supplies to perform the work.
  - 2. The Competent Person has four (4) years of abatement experience of which two (2) years were as the Competent Person on the project; meets the OSHA definition of a Competent Person; has been the Competent Person on two (2) projects of similar size and complexity as this project; has completed EPA AHERA/OSHA/State/Local training requirements/accreditation(s) and refreshers; and has all required OSHA documentation related to medical and respiratory protection.
  - 3. The Contractor Professional Industrial Hygienist (CPIH) shall have five (5) years of monitoring experience and supervision of asbestos abatement projects; has participated as senior IH on five (5) abatement projects, three (3) of which are similar in size and complexity as this project; has developed at least one complete

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standard operating procedure for asbestos abatement; has trained abatement personnel for three (3) years; has specialized EPA AHERA/OSHA training in asbestos abatement management, respiratory protection, waste disposal and asbestos inspection; has completed the NIOSH 582 Course, Contractor/Supervisor course; and has appropriate medical/respiratory protection records/documentation.

4. The Abatement Personnel shall have completed the EPA AHERA/OSHA abatement worker course; have training on the standard operating procedures of the Contractor; has one year of asbestos abatement experience; has applicable medical and respiratory protection documentation; has certificate of training/current refresher and State accreditation/license.

**1.26 GENERAL - RESPIRATORY PROTECTION PROGRAM**

The Contractor shall develop and implement a Respiratory Protection Program (RPP) which is in compliance with the January 8, 1998 OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910.132;134. ANSI Standard Z88.2-1992 provides excellent guidance for developing a respiratory protection program. All respirators used must be NIOSH approved for asbestos abatement activities. The written respiratory protection shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c)(1)(i - ix) - Respiratory Protection Program.

**1.27 RESPIRATORY PROTECTION PROGRAM COORDINATOR**

The Respiratory Protection Program Coordinator (RPPC) must be identified and shall have two (2) years experience coordinating the program. The RPPC must provide a signed statement attesting to the fact that the program meets the above requirements.

**1.28 SELECTION AND USE OF RESPIRATORS**

The procedure for the selection and use of respirators must be submitted to the VA as part of the Contractor's qualification. The procedure must be written clearly enough for workers to understand. A copy of the Respiratory Protection Program must be available in the clean room of the decontamination unit for reference by employees or authorized visitors.

**1.29 MINIMUM RESPIRATORY PROTECTION**

Minimum respiratory protection shall be a half face, HEPA filtered, air purifying respirator when fiber levels are maintained consistently at or below 0.1 f/cc. A higher level of respiratory protection may be provided or required, depending on fiber levels. Respirator selection shall meet

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the requirements of 29 CFR 1926.1101 (h); Table 1, except as indicated in this paragraph. Abatement personnel must have a respirator for their exclusive use.

**1.30 MEDICAL WRITTEN OPINION**

No employee shall be allowed to wear a respirator unless a physician has determined they are capable of doing so and has issued a current written opinion for that person.

**1.31 RESPIRATOR FIT TEST**

All personnel wearing respirators shall have a current qualitative/quantitative fit test which was conducted in accordance with 29 CFR 1910.134 (f) and Appendix A. Fit tests shall be done for PAPR's which have been put into a failure mode.

**1.32 RESPIRATOR FIT CHECK**

The Competent Person shall assure that the positive/negative fit check is done each time the respirator is donned by an employee. Headcoverings must cover respirator headstraps. Any situation that prevents an effective facepiece to face seal as evidenced by failure of a fit check shall preclude that person from wearing a respirator until resolution of the problem.

**1.33 MAINTENANCE AND CARE OF RESPIRATORS**

The Respiratory Protection Program Coordinator shall submit evidence and documentation showing compliance with 29 CFR 1910.134 (h) Maintenance and care of respirators.

**1.34 TRAINING OF ABATEMENT PERSONNEL**

Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9) and any additional State/Local requirements. Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and current refresher and accreditation proof must be submitted for each person working at the site.

**1.35 MEDICAL EXAMINATIONS**

Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. The physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the opinion the person has been evaluated for



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working in a heat stress environment while wearing personal protective equipment and is able to perform the work.

**1.36 PERSONAL PROTECTIVE EQUIPMENT**

Provide whole body clothing, head coverings, foot coverings and any other personal protective equipment as determined by conducting the hazard assessment required by OSHA at 29 CFR 1910.132 (d). The Competent Person shall ensure the integrity of personal protective equipment worn for the duration of the project. Duct tape shall be used to secure all suit sleeves to wrists and to secure foot coverings at the ankle.

**1.37 REGULATED AREA ENTRY PROCEDURE**

Worker protection shall meet the most stringent requirements. The Competent Person shall ensure that each time workers enter the regulated area, they remove ALL street clothes in the clean room of the decontamination unit and put on new disposable coveralls, head coverings, a clean respirator, and then proceed through the shower room to the equipment room where they put on non-disposable required personal protective equipment.

**1.38 DECONTAMINATION PROCEDURE**

The Competent Person shall require all personnel to adhere to following decontamination procedures whenever they leave the regulated area.

- A. When exiting the regulated area, remove all disposable PPE and dispose of in a disposal bag provided in the regulated area.
- B. Carefully decontaminate and clean the respirator. Put in a clean container/bag.

**1.39 REGULATED AREA REQUIREMENTS**

The Competent Person shall meet all requirements of 29 CFR 1926.1101 (o) and assure that all requirements for Class I glovebag regulated areas at 29 CFR 1926.1101 (e) are met applicable to Class II work. All personnel in the regulated area shall not be allowed to eat, drink, smoke, chew tobacco or gum, apply cosmetics, or in any way interfere with the fit of their respirator.

**1.40 DESCRIPTION**

Provide each regulated area with a fiber drum with a disposal bag in it for personnel waste materials.

**1.41 WASTE/EQUIPMENT DECONTAMINATION AREA (W/EDA)**

The Competent Person shall provide a W/EDA for removal of all waste, equipment and contaminated material from the regulated area.

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**1.42 WASTE/EQUIPMENT DECONTAMINATION PROCEDURES**

Contain all waste in 6 mil poly bags. Clean/decontaminate bags and pass through a double 6 mil flap doorway into another bag or fiber drum. Remove to disposal dumpster/gondola/vehicle. At no time shall unprotected personnel from the clean side be allowed to enter the regulated area.

**PART 2 - PRODUCTS**

**2.1 GENERAL REQUIREMENTS (ALL ABATEMENT PROJECTS)**

Prior to the start of work, the Contractor shall provide and maintain a sufficient quantity of materials and equipment to assure continuous and efficient work throughout the duration of the project. Work shall not start unless the following items have been delivered to the site and the CPIH has submitted verification to the VA's representative to this effect:

- A. All materials shall be delivered in their original package, container or bundle bearing the name of the manufacturer and the brand name (where applicable).
- B. Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Flammable materials cannot be stored inside buildings. Replacement materials shall be stored outside of the regulated/work area until abatement is completed.
- C. The Contractor shall not block or hinder use of buildings by patients, staff, and visitors to the VA in partially occupied buildings by placing materials/equipment in any unauthorized place.
- D. The Competent Person shall inspect for damaged, deteriorating or previously used materials. Such materials shall not be used and shall be removed from the worksite and disposed of properly.
- D. Poly sheeting for critical barriers/floors in the regulated area shall be 6 mil.
- F. If required, the method of attaching polyethylene sheeting shall be agreed upon in advance by the Contractor and the VA and selected to minimize damage to equipment and surfaces.
- G. An adequate number of infra-red heating units, HEPA vacuums, scrapers, sprayers, nylon brushes, brooms, disposable mops, rags, sponges, staple guns, shovels, ladders and scaffolding of suitable height and length as well as meeting OSHA requirements shall be provided. Fall protection devices, water hose to reach all areas in the regulated area, airless

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spray equipment, and any other tools, materials or equipment required to conduct the abatement project shall also be provided. All electrically operated hand tools, equipment, electric cords shall be equipped with GFCI protection.

- H. Special protection for objects in the regulated area shall be detailed. (e.g., plywood over carpeting or hardwood floors to prevent damage from scaffolds, water, and falling material.)
- I. Impermeable fiberboard drums and disposal bags 2 layers of 6 mil, for asbestos waste shall be pre-printed with labels, markings and address as required by OSHA, EPA and DOT regulations.
- J. The VA shall be provided a copy of the MSDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication. Chlorinated compounds shall not be used with any spray adhesive or other product. Appropriate encapsulant(s) shall be provided.
- K. OSHA DANGER demarcation signs, as many and as required by OSHA 29 CFR 1926.1101(k)(7) shall be provided and placed by the Competent Person. All other posters and notices required by Federal and State regulations shall be posted in the Clean Room.
- L. Adequate and appropriate PPE for the project and number of personnel/shifts shall be provided. All personal protective equipment issued must be based on a hazard assessment conducted under 29 CFR 1910.132(d).

**2.2 CONTAINMENT BARRIERS AND COVERINGS IN THE REGULATED AREA**

- A. Using critical barriers, seal off the perimeter to the regulated area to completely isolate the regulated area from adjacent spaces. All horizontal surfaces, as required, in the regulated area must be covered with 2 layers of 6 mil fire retardant poly to prevent contamination and to facilitate clean-up. Should adjacent areas become contaminated, immediately stop work and clean up the contamination at no additional cost to the Government. Provide firestopping and identify all fire barrier penetrations due to abatement work as specified in Section 2.2.8; Section 07 84 00, FIRESTOPPING. 2.2.2 PREPARATION PRIOR TO SEALING THE REGULATED AREA
- B. Place all tools, scaffolding, materials and equipment needed for working in the regulated area prior to erecting any plastic sheeting. Remove all uncontaminated removable furniture, equipment and/or supplies from the regulated area before commencing work, or completely cover with two

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layers of 6-mil fire retardant poly sheeting and secure with duct tape.  
Lock out and tag out any HVAC systems in the regulated area.

**2.3 CONTROLLING ACCESS TO THE REGULATED AREA**

Access to the regulated area is allowed only through the personnel decontamination facility (PDF), if required. All other means of access shall be eliminated and OSHA DANGER demarcation signs posted as required by OSHA. If the regulated area is adjacent to or within view of an occupied area, provide a visual barrier of 6 mil opaque fire retardant poly sheeting to prevent building occupant observation. If the adjacent area is accessible to the public, the barrier must be solid.

**2.4 CRITICAL BARRIERS**

Completely separate any openings into the regulated area from adjacent areas using fire retardant poly at least 6 mils thick and duct tape. Individually seal with two layers of 6 mil poly and duct tape all HVAC openings into the regulated area. Individually seal all lighting fixtures, clocks, doors, windows, convectors, speakers, or any other objects in the regulated area. Heat must be shut off any objects covered with poly.

**2.5 SECONDARY BARRIERS**

A loose layer of 6 mil fire retardant poly shall be used as a drop cloth to protect the floor/horizontal surfaces from debris generated during the Class II work, except for floor tile abatement. This layer shall be replaced as needed during the work.

**2.6 AREAS OUTSIDE CONTAINMENT AREA**

Asbestos contractor is responsible to not disturb areas outside the containment area. Areas surrounding the containment need to be continuously checked to ensure integrity of the containment and that the abatement work does not create any disturbances, damage or openings to the containment.

**2.7 EXTENSION OF THE REGULATED AREA**

If the enclosure of the regulated area is breached in any way that could allow contamination to occur, the affected area shall be included in the regulated area and constructed as per this section. If the affected area cannot be added to the regulated area, decontamination measures must be started immediately and continue until air monitoring indicates background levels are met.

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**2.8 FIRESTOPPING**

- A. Through penetrations caused by cables, cable trays, pipes, sleeves must be firestopped with a fire-rated firestop system providing an air tight seal.
- B. Firestop materials that are not equal to the wall or ceiling penetrated shall be brought to the attention of the VA Representative. The Contractor shall list all areas of penetration, the type of sealant used, and whether or not the location is fire rated. Any discovery of penetrations during abatement shall be brought to the attention of the VA Representative immediately. All walls, floors and ceilings are considered fire rated unless otherwise determined by the VA Representative or Fire Marshall.
- C. Any visible openings whether or not caused by a penetration shall be reported by the Contractor to the VA Representative for a sealant system determination. Firestops shall meet ASTM E814 and UL 1479 requirements for the opening size, penetrant, and fire rating needed.

**2.9 MONITORING, INSPECTION AND TESTING**

- A. Perform throughout abatement work monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications. The CPIH shall periodically inspect and oversee the performance of the Contractor IH Technician. The IH Technician shall continuously inspect and monitor conditions inside the regulated area to ensure compliance with these specifications. In addition, the CPIH shall personally manage air sample collection, analysis, and evaluation for personnel, regulated area, and adjacent area samples to satisfy OSHA requirements. Additional inspection and testing requirements are also indicated in other parts of this specification.
- B. The VA will employ an independent industrial hygienist (VPIH/CIH) consultant and/or use its own IH to perform various services on behalf of the VA. The VPIH/CIH will perform the necessary monitoring, inspection, testing, and other support services to ensure that VA patients, employees, and visitors will not be adversely affected by the abatement work, and that the abatement work proceeds in accordance with these specifications, that the abated areas or abated buildings have been successfully decontaminated. The work of the VPIH/CIH consultant in no way relieves the Contractor from their responsibility to perform the work in accordance with contract/specification requirements, to perform

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continuous inspection, monitoring and testing for the safety of their employees, and to perform other such services as specified. The cost of the VPIH/CIH and their services will be borne by the VA except for any repeat of final inspection and testing that may be required due to unsatisfactory initial results. Any repeated final inspections and/or testing, if required, will be paid for by the Contractor.

- C. If fibers counted by the VPIH/CIH during abatement work inside the regulated area, utilizing the NIOSH 7400 air monitoring method, exceed 0.05 f/cc, the Contractor shall stop work. If fiber levels exceed 0.01 f/cc outside the regulated area, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. Request must be in writing and submitted to the VA's representative. Cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Confirmation sampling and analysis will be the responsibility of the CPIH with review and approval of the VPIH/CIH. An agreement between the CPIH and the VPIH/CIH shall be reached on the exact details of the confirmation effort, in writing, including such things as the number of samples, location, collection, quality control on-site, analytical laboratory, interpretation of results and any follow-up actions. This written agreement shall be co-signed by the IH's and delivered to the VA's representative.

**2.10 SCOPE OF SERVICES OF THE VPIH/CIH CONSULTANT**

- A. The purpose of the work of the VPIH/CIH is to: assure quality; resolve problems; and prevent the spread of contamination beyond the regulated area. In addition, their work includes performing the final inspection and testing to determine whether the regulated area or building has been adequately decontaminated. All air monitoring is to be done utilizing PCM/TEM. The VPIH/CIH will perform the following tasks:
1. Task 1: Establish background levels before abatement begins by collecting background samples. Retain samples for possible TEM analysis.
  2. Task 2: Perform continuous air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect any faults in the regulated area isolation and any adverse impact on the surroundings from regulated area activities.

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3. Task 3: Perform unannounced visits to spot check overall compliance of work with contract/specifications. These visits may include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.
  4. Task 4: Provide support to the VA representative such as evaluation of submittals from the Contractor, resolution of unforeseen developments, etc.
  5. Task 5: Perform, in the presence of the VA representative, final inspection and testing of a decontaminated regulated area or building at the conclusion of the abatement and clean-up work to certify compliance with all regulations and the VA requirements/specifications.
  6. Task 6: Issue certificate of decontamination for each regulated area or building and project report.
- B. All documentation, inspection results and testing results generated by the VPIH/CIH will be available to the Contractor for information and consideration. The Contractor shall cooperate with and support the VPIH/CIH for efficient and smooth performance of their work.
- C. The monitoring and inspection results of the VPIH/CIH will be used by the VA to issue any Stop Removal orders to the Contractor during abatement work and to accept or reject a regulated area or building as decontaminated.
- D. All air sampling and analysis data will be recorded on VA Form 10-0018.

**2.11 MONITORING, INSPECTION AND TESTING BY CONTRACTOR CPIH**

The CPIH is responsible for managing all monitoring, inspections, and testing required by these specifications, as well as any and all regulatory requirements adopted by these specifications. The CPIH is responsible for the continuous monitoring of all subsystems and procedures which could affect the health and safety of the Contractor's personnel. Safety and health conditions and the provision of those conditions inside the regulated area for all persons entering the regulated area is the exclusive responsibility of the Contractor /Competent Person. The person performing the personnel and area air monitoring inside the regulated area shall be an IH Technician, who shall be trained and shall have specialized field experience in air sampling and analysis. The IH Technician shall have a NIOSH 582 Course or equivalent and show proof. The IH Technician shall participate in the AIHA Asbestos Analysis Registry or participate in the Proficiency

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Analytic Testing program of AIHA for fiber counting quality control assurance. The IH Technician shall also be an accredited EPA/State Contractor/Supervisor and Building Inspector. The IH Technician shall have participated in five abatement projects collecting personal and area samples as well as responsibility for documentation. The analytic laboratory used by the Abatement Contractor to analyze the samples shall be AIHA accredited for asbestos PAT. A daily log documenting all OSHA requirements for air monitoring for asbestos in 29 CFR 1926.1101(f), (g) and Appendix A. This log shall be made available to the VA representative and the VPIH/CIH. The log will contain, at a minimum, information on personnel or area sampled, other persons represented by the sample, the date of sample collection, start and stop times for sampling, sample volume, flow rate, and fibers/cc. The CPIH shall collect and analyze samples for each representative job being done in the regulated area, i.e., removal, wetting, clean-up, and load-out. No fewer than two personal samples per shift shall be collected and one area sample per 1,000 square feet of regulated area where abatement is taking place and one sample per shift in the clean room area shall be collected. In addition to the continuous monitoring required, the CPIH will perform inspection and testing at the final stages of abatement for each regulated area as specified in the CPIH responsibilities.

**2.12 STANDARD OPERATING PROCEDURES**

The Contractor shall have established Standard Operating Procedures (SOP's) in printed form and loose leaf folder consisting of simplified text, diagrams, sketches, and pictures that establish and explain clearly the ways and procedures to be followed during all phases of the work by the contractor's personnel. The SOP's must be modified as needed to address specific requirements of the project. The SOP's shall be submitted for review and approval prior to the start of any abatement work. The minimum topics and areas to be covered by the SOP's are:

- A. Minimum Personnel Qualifications
- B. Contingency Plans and Arrangements
- C. Security and Safety Procedures
- D. Respiratory Protection/Personal Protective Equipment Program and Training
- E. Medical Surveillance Program and Recordkeeping
- F. Regulated Area Requirements for Class II work
- G. Decontamination Facilities and Entry/Exit Procedures (PDF and W/EDF)



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- H. Monitoring, Inspections, and Testing
- I. Removal Procedures for Class II Materials
- J. Disposal of ACM Waste
- K. Regulated Area Decontamination/Clean-up
- L. Regulated Area Visual and Air Clearance
- M. Project Completion/Closeout

**2.13 PRE-START MEETING SUBMITTALS**

Submit to the VA a minimum of 14 days prior to the pre-start meeting the following for review and approval. Meeting this requirement is a prerequisite for the pre-start meeting for this project. The submittal shall be organized such that the required information is provided in order as listed below. Each section shall include a separate title page referencing the pre-start meeting submittal section.

- A. Submit a detailed work schedule for the entire project reflecting contract documents and the phasing/schedule requirements from the CPM chart.
- B. Submit a staff organization chart showing all personnel who will be working on the project and their capacity/function. Provide their qualifications, training, accreditations, and licenses, as appropriate. Provide a copy of the "Certificate of Worker's Acknowledgment" and the "Affidavit of Medical Surveillance and Respiratory Protection" for each person.
- C. Submit Standard Operating Procedures developed specifically for this project, incorporating the requirements of the specifications, prepared, signed and dated by the CPIH.
- D. Submit the specifics of the materials and equipment to be used for this project with brand names, model numbers, performance characteristics, pictures/diagrams, and number available for the following:
  - 1. HEPA vacuums, air monitoring pumps, calibration devices, infrared heating machines, and emergency power generating system.
  - 2. Encapsulants, surfactants, hand held sprayers, airless sprayers, fire extinguishers.
  - 3. Personal protective equipment.
  - 4. Fire safety equipment to be used in the regulated area.
- E. Submit the name, location, and phone number of the approved landfill; proof/verification the landfill is approved for ACM disposal; the landfill's requirements for ACM waste; the type of vehicle to be used for transportation; and name, address, and phone number of

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subcontractor, if used. Proof of asbestos training for transportation personnel shall be provided.

- F. Submit required notifications and arrangements made with regulatory agencies having regulatory jurisdiction and the specific contingency/emergency arrangements made with local health, fire, ambulance, hospital authorities and any other notifications/arrangements.
- G. Submit the name, location and verification of the laboratory and/or personnel to be used for analysis of air and/or bulk samples. Air monitoring must be done in accordance with OSHA 29 CFR 1926.1101(f) and Appendix A.
- H. Submit qualifications verification: Submit the following evidence of qualifications. Make sure that all references are current and verifiable by providing current phone numbers and documentation.
1. Asbestos Abatement Company: Project experience within the past 3 years; listing projects first most similar to this project:  
Project Name; Type of Abatement; Duration; Cost; Reference Name/Phone Number; Final Clearance; Completion Date
  2. List of project(s) halted by owner, A/E, IH, regulatory agency in the last 3 years:  
Project Name; Reason; Date; Reference Name/Number; Resolution
  3. List asbestos regulatory citations, penalties, damages paid and legal actions taken against the company in the last 3 years. Provide copies and all information needed for verification.
- I. Submit information on personnel: Provide a resume; address each item completely; provide references; phone numbers; copies of certificates, accreditations, and licenses. Submit an affidavit signed by the CPIH stating that all personnel submitted below have medical records in accordance with OSHA 29 CFR 1926.1101(m) and 29 CFR 1910.20 and that the company has implemented a medical surveillance program and maintains recordkeeping in accordance with the above regulations. Submit the phone number and doctor/clinic/hospital used for medical evaluations.
1. CPIH: Name; years of abatement experience; list of projects similar to this one; certificates, licenses, accreditations for proof of AHERA/OSHA specialized asbestos training; professional affiliations; number of workers trained; samples of training materials; samples of SOP's developed; medical opinion; current respirator fit test.

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2. Competent Person(s)/Supervisor(s): Number; names; years of abatement experience as Competent Person/Supervisor; list of similar projects as Competent Person/Supervisor; as a worker; certificates, licenses, accreditations; proof of AHERA/OSHA specialized asbestos training; maximum number of personnel supervised on a project; medical opinion; current respirator fit test.
3. Workers: Numbers; names; years of abatement experience; certificates, licenses, accreditations; training courses in asbestos abatement and respiratory protection; medical opinion; current respirator fit test.
- J. Submit copies of State license for asbestos abatement; copy of insurance policy, including exclusions with a letter from agent stating in plain English the coverage provided and the fact that asbestos abatement activities are covered by the policy; copy of SOP's incorporating the requirements of this specification; information on who provides your training, how often; who provides medical surveillance, how often; who does and how is air monitoring conducted; a list of references of independent laboratories/IH's familiar with your air monitoring and standard operating procedures; copies of monitoring results of the five referenced projects listed and analytical method(s) used.
- K. When rental equipment is to be used in regulated areas or used to transport asbestos waste, the contractor shall assure complete decontamination of the rental equipment before return to the rental agency.

**2.14 SUBMITTALS DURING ABATEMENT**

- A. The Competent Person shall maintain and submit a daily log at the regulated area documenting the dates and times of the following: purpose, attendees and summary of meetings; all personnel entering/exiting the regulated area; document and discuss the resolution of unusual events such as critical barrier breeching, equipment failures, emergencies, and any cause for stopping work; representative air monitoring and results/TWA's/EL's. Submit this daily log to VA's representative.
- B. The CPIH shall document and maintain the following during abatement and submit as appropriate to the VA's representative.
  1. Inspection and approval of the regulated area preparation prior to start of work and daily during work.
  2. Removal of any poly critical/floor barriers.
  3. Visual inspection/testing by the CPIH.

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4. Packaging and removal of ACM waste from regulated area.
5. Disposal of ACM waste materials; copies of Waste Shipment Records/landfill receipts to the VA's representative on a weekly basis.

**2.15 SUBMITTALS AT COMPLETION OF ABATEMENT**

The CPIH shall submit a project report consisting of the daily log book requirements and documentation of events during the abatement project including Waste Shipment Records signed by the landfill's agent. The report shall include a certificate of completion, signed and dated by the CPIH, in accordance with Attachment #1. The VA Representative will forward the abatement report to the Medical Center after completion of the project.

**PART 3 - EXECUTION**

**3.1 PRE-ABATEMENT MEETING**

The VA representative, upon receipt, review, and substantial approval of all pre-abatement submittals and verification by the CPIH that all materials and equipment required for the project are on the site, will arrange for a pre-abatement meeting between the Contractor, the CPIH, Competent Person(s), the VA representative(s), and the VPIH/CIH. The purpose of the meeting is to discuss any aspect of the submittals needing clarification or amplification and to discuss any aspect of the project execution and the sequence of the operation. The Contractor shall be prepared to provide any supplemental information/ documentation to the VA's representative regarding any submittals, documentation, materials or equipment. Upon satisfactory resolution of any outstanding issues, the VA's representative will issue a written order to proceed to the Contractor. No abatement work of any kind described in the following provisions shall be initiated prior to the VA written order to proceed.

**3.2 PRE-ABATEMENT INSPECTIONS AND PREPARATIONS**

Before any work begins on the construction of the regulated area, the Contractor will:

- A. Conduct a space-by-space inspection with an authorized VA representative and prepare a written inventory of all existing damage in those spaces where asbestos abatement will occur. Still or video photography may be used to supplement the written damage inventory. Document will be signed and certified as accurate by both parties.
- B. The VA Representative, the Contractor, and the VPIH/CIH must be aware of 10/95 A/E Quality Alert indicating the failure to identify asbestos as

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applicable to glovebag abatement in the areas listed. Make sure these areas are looked at/reviewed on the project:

Lay-in ceilings concealing ACM; ACM behind walls/windows from previous renovations; inside chases/walls; transite piping/ductwork/sheets; behind radiators; below window sills; water/sewer lines; electrical conduit coverings; steam line trench coverings.

- C. Clean and remove or properly protect from contamination all furniture, machinery, equipment, curtains, drapes, blinds, and other movable objects which the Contractor is required to remove from the regulated area.
- D. Shut down and seal with a minimum of 2 layers of 6 mil fire retardant poly all HVAC systems and critical openings in the regulated area. The regulated area critical barriers shall completely isolate the regulated area from any other air in the building. The VA's representative will monitor the isolation provision.
- E. Shut down and lock out in accordance with 29 CFR 1910.147 all electrical circuits which pose a potential hazard. Electrical arrangements will be tailored to the particular regulated area and the systems involved. All electrical circuits affected will be turned off at the circuit box outside the regulated area, not just the wall switch. The goal is to eliminate the potential for electrical shock which is a major threat to life in the regulated area due to water use and possible energized circuits. Electrical lines used to power equipment in the regulated area shall conform to all electrical safety standards and shall be isolated by the use of a ground fault circuit interrupter (GFCI). All GFCI shall be tested prior to use. The VA's representative will monitor the electrical shutdown.
- F. If required, remove and dispose of carpeting from floors in the regulated area.
- G. Inspect existing firestopping in the regulated area. Correct as needed.

**3.3 PRE-ABATEMENT CONSTRUCTION AND OPERATIONS**

- A. Perform all preparatory work for the first regulated area in accordance with the approved work schedule and with this specification.
- B. Upon completion of all preparatory work, the CPIH will inspect the work and systems and will notify the VA's representative when the work is completed in accordance with this specification. The VA's representative may inspect the regulated area and the systems with the VPIH/CIH and may require that upon satisfactory inspection, Contractor's employees

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perform all major aspects of the approved SOP's, especially worker protection, respiratory systems, contingency plans, decontamination procedures, and monitoring to demonstrate satisfactory operation.

- C. The CPIH shall document the pre-abatement activities described above and deliver a copy to the VA's representative.
- D. Upon satisfactory inspection of the installation of and operation of systems the VA's representative will notify the Contractor in writing to proceed with the Class II asbestos abatement work in accordance with this specification.

**3.4 OSHA DANGER SIGNS**

Post OSHA DANGER signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to the regulated area where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the regulated area to permit any personnel to read the sign and take the necessary measures to avoid exposure. Additional signs will be posted following construction of the regulated area enclosure.

**3.5 SHUT DOWN - LOCK OUT ELECTRICAL**

Shut down and lock out electric power to the regulated area. Provide temporary power and lighting. Ensure safe installation including GFCI of temporary power sources and equipment by compliance with all applicable electrical code requirements and OSHA requirements for temporary electrical systems. Electricity shall be provided by the VA.

**3.6 SHUT DOWN - LOCK OUT HVAC**

Shut down and lock out heating, cooling, and air conditioning system (HVAC) components that are in, supply or pass through the regulated area. Investigate the regulated area and agree on pre-abatement condition with the VA's representative. Seal all intake and exhaust vents in the regulated area with duct tape and 2 layers of 6-mil poly. Also, seal any seams in system components that pass through the regulated area. Remove all contaminated HVAC system filters and place in labeled 6 mil poly disposal bags for disposal as asbestos waste.

**3.7 SANITARY FACILITIES**

The Contractor shall provide sanitary facilities for abatement personnel and maintain them in a clean and sanitary condition throughout the abatement project.

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**3.8 WATER FOR ABATEMENT**

The VA will provide water for abatement purposes. The Contractor shall connect to the existing VA system. The service to the shower(s) shall be supplied with backflow prevention.

**3.9 PRE-CLEANING MOVABLE OBJECTS**

Pre-clean all movable objects within the regulated area using a HEPA filtered vacuum and/or wet cleaning methods as appropriate. After cleaning, these objects shall be removed from the regulated area and carefully stored in an uncontaminated location.

**3.10 PRE-CLEANING FIXED OBJECTS**

Pre-clean all fixed objects in the regulated area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention must be paid to machinery behind grills or gratings where access may be difficult but contamination may be significant. Also, pay particular attention to wall, floor and ceiling penetration behind fixed items. After precleaning, enclose fixed objects with 2 layers of 6-mil poly and seal securely in place with duct tape. Objects (e.g., permanent fixtures, shelves, electronic equipment, laboratory tables, sprinklers, alarm systems, closed circuit TV equipment and computer cables) which must remain in the regulated area and that require special ventilation or enclosure requirements should be designated here along with specified means of protection. Contact the manufacturer for special protection requirements.

**3.11 PRE-CLEANING SURFACES IN THE REGULATED AREA**

Pre-clean all surfaces in the regulated area using HEPA filtered vacuums and/or wet cleaning methods as appropriate. Do not use any methods that would raise dust such as dry sweeping or vacuuming with equipment not equipped with HEPA filters. Do not disturb asbestos-containing materials during this pre-cleaning phase.

**3.12 CONTAINMENT BARRIERS AND COVERINGS FOR THE REGULATED AREA**

Seal off any openings at the perimeter of the regulated area with critical barriers to completely isolate the regulated area and to contain all airborne asbestos contamination created by the abatement activities. Should the adjacent area past the regulated area become contaminated due to improper work activities, the Contractor shall suspend work inside the regulated area, continue wetting, and clean the adjacent areas in accordance with procedures described in these

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specifications. Any and all costs associated with the adjacent area cleanup shall not be borne by the VA.

**3.13 PREPARATION PRIOR TO SEALING OFF**

Place all infrared machines, materials, equipment and supplies necessary to isolate the regulated area inside the regulated area. Remove all movable material/equipment as described above and secure all unmovable material/equipment as described above. Properly secured material/equipment shall be considered to be outside the regulated area.

**3.14 CONTROLLING ACCESS TO THE REGULATED AREA**

Access to the regulated area shall be permitted only by the competent person. All other means of access shall be closed off by proper sealing and OSHA DANGER demarcation signs posted on the clean side of the regulated area where it is adjacent to or within view of any occupiable area. An opaque visual barrier of 6 mil poly shall be provided so that the abatement work is not visible to any building occupants. If the area adjacent to the regulated area is accessible to the public, construct a solid barrier on the public side of the sheeting for protection and isolation of the project. The barrier shall be constructed with normal 2" x 4" (50mm x 100mm) wood or metal studs 16" (400mm) on centers, securely anchored to prevent movement and covered with a minimum of ½" (12.5mm) plywood. Provide an appropriate number of OSHA DANGER signs for each visual and physical barrier. Any alternative method must be given a written approval by the VA's representative.

**3.15 CRITICAL BARRIERS**

- A. The regulated area must be completely separated from the adjacent areas, and the outside by at least 2 layers of 6 mil fire retardant poly and duct tape/spray adhesive. Individually seal all supply and exhaust ventilation openings, lighting fixtures, clocks, doorways, windows, convectors, speakers, and other openings into the regulated area with 2 layers of 6 mil fire retardant poly, and taped securely in place with duct tape/spray adhesive.
- B. The containment barriers and coverings shall be constructed and maintained in such a manner as to prevent disturbances, damage, or openings in the containment. The containment barriers and coverings shall be inspected on an ongoing basis to ensure the integrity of the containment barriers. Critical barriers must remain in place and the containment must remain under negative pressure until all work and



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clearances have been completed and authorization has been granted by the VPIH/CIH to remove the critical barriers.

**3.16 EXTENSION OF THE REGULATED AREA**

If the regulated area barrier is breached in any manner that could allow the passage of asbestos fibers or debris, the Competent Person shall immediately stop work, continue wetting, and proceed to extend the regulated area to enclose the affected area as per procedures described in this specification. If the affected area cannot be enclosed, decontamination measures and cleanup shall start immediately. All personnel shall be isolated from the affected area until decontamination/cleanup is completed as verified by visual inspection and air monitoring. Air monitoring at completion must indicate background levels or less than 0.01 f/cc.

**3.17 FLOOR BARRIERS**

If floor removal is not being done, all floors in the regulated area shall be covered with 2 layers of 6 mil fire retardant poly and brought up the wall 12 inches.

**3.18 REMOVAL OF CLASS II FLOORING; ROOFING; AND TRANSITE MATERIALS**

All applicable requirements of OSHA, EPA, and DOT shall be followed during Class II work. Keep materials intact; do not disturb; wet while working with it; wrap as soon as possible with 2 layers of 6 mil plastic for disposal.

**3.19 REMOVAL OF FLOORING MATERIALS**

- A. All requirements of OSHA Flooring agreement provisions shall be followed:
1. Negative air machine shall be used to affect some negative pressure in the regulated area. A spare machine shall be available.
  2. Follow RFCI recommended work practices for removal of resilient Floor coverings.
  3. Mechanical chipping or sanding is not allowed.
  4. Wet clean and HEPA vacuum the floor before and after removal of flooring.
  5. Place a 6 mil poly layer 4' by 10' adjacent to the regulated area for use as a decontaminated area. All waste must be contained in the regulated area.
  6. Package all waste in 6 mil poly lined fiberboard drums.

**3.20 REMOVAL OF MASTIC**

- A. The mastic removal material must be a "low odor" or "no odor" material.

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- B. Follow RFCI recommended work practices for removal of mastic.
- C. Package all waste in 6 mil poly lined fiberboard drums.
- D. Prior to application of any liquid material, check the floor for penetrations and seal before removing mastic.
- E. The use of any solvents is prohibited in the removal of mastic.

**3.21 DISPOSAL OF CLASS II WASTE MATERIAL**

Package and dispose of waste materials as per this specification. All OSHA, EPA, and DOT requirements must be met. Landfill requirements for packaging must also be met. Disposal of non-friable waste must be done in accordance with applicable regulations.

**3.22 PROJECT DECONTAMINATION**

- A. The entire work related to project decontamination shall be performed under the close supervision and monitoring of the CPIH.
- B. If the asbestos abatement work is in an area which was contaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal and cleaning of the regulated area surfaces after the primary barrier removal.
- C. If the asbestos abatement work is in an area which was uncontaminated prior to the start of abatement, the decontamination will be done by cleaning the primary barrier poly prior to its removal, thus preventing contamination of the building when the regulated area critical barriers are removed.

**3.23 REGULATED AREA CLEARANCE**

Air testing and other requirements which must be met before release of the Contractor and re-occupancy of the regulated area space are specified in Final Testing Procedures.

**3.24 WORK DESCRIPTION**

Decontamination includes the cleaning and clearance of the air in the regulated area and the decontamination and removal of the enclosures/facilities installed prior to the abatement work including primary/critical barriers, PDF and W/EDF facilities.

**3.25 PRE-DECONTAMINATION CONDITIONS**

- A. Before decontamination starts, all ACM waste from the regulated area shall be removed, all waste collected and removed, and the secondary barrier of poly removal and disposed of along with any gross debris generated by the work.
- B. At the start of decontamination, the following shall be in place:

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1. Critical barriers over all openings consisting of two layers of 6 mil poly which is the sole barrier between the regulated area and the rest of the building or outside.
2. Decontamination facilities, if required for personnel and equipment in operating condition.

**3.26 CLEANING**

Clean all surfaces of the regulated area by wet methods and/or HEPA vacuuming. Do not use dry dusting/sweeping methods. If determined by the CPIH/VPIH/CIH additional cleaning(s) may be needed.

**3.27 VISUAL INSPECTION AND AIR CLEARANCE TESTING**

Notify the VA representative 24 hours in advance for the performance of the final visual inspection and testing. The final visual inspection and testing will be performed by the VPIH/CIH after the cleaning.

**3.28 VISUAL INSPECTION**

Final visual inspection will include the entire regulated area, all poly sheeting, seals over HVAC openings, doorways, windows, and any other openings. If any debris, residue, dust or any other suspect material is detected, the cleaning shall be repeated at no cost to the VA. Dust/material samples may be collected and analyzed at no cost to the VA at the discretion of the VPIH/CIH to confirm visual findings. When the regulated area is visually clean the final testing can be done.

**3.29 AIR CLEARANCE TESTING**

- A. After an acceptable final visual inspection by the VPIH/CIH and VA Representative, the VPIH/CIH will perform the final testing. Air samples will be collected and analyzed in accordance with procedures for PCM in this specification. If the release criteria are not met, the Contractor shall repeat the final cleaning and continue decontamination procedures. Additional inspection and testing will be done at the expense of the Contractor.
- B. If the results of the PCM are acceptable, remove the critical barriers. Any small quantities of residue material found upon removal of the poly shall be removed with a HEPA vacuum and localized isolation. If significant quantities are found as determined by the VPIH/CIH, then the entire area affected shall be cleaned as specified in the final cleaning.
- C. If release criteria are met, proceed to perform the abatement closeout and to issue the certificate of completion in accordance with these specifications.

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**3.30 FINAL AIR CLEARANCE PROCEDURES**

- A. Contractor's Release Criteria: Work in a regulated area is complete when the regulated area is visually clean and airborne fiber levels have been reduced to or below 0.01 f/cc as measured with PCM methods and verified by VPIH/CIH. The asbestos containment is to remain in place and under negative pressure until inspected and removal of the containment is authorized by the VPIH/CIH.
- B. Air Monitoring and Final Clearance Sampling: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to the specified level, the VPIH/CIH will secure samples and analyze them according to the following procedures:
1. Fibers Counted: "Fibers" referred to in this section shall be either all fibers regardless of composition as counted in the NIOSH 7400 PCM method.
  2. All clearance air testing samples shall be collected on 0.8 $\mu$  MCE filters for PCM analysis. Air samples will be collected in areas subject to normal air circulation. A minimum of 5 PCM samples will be collected with at least 1200 Liters of air sampled. All results must be less than 0.01 f/cc for clearance.

**3.31 COMPLETION OF ABATEMENT WORK**

- A. After thorough decontamination, complete asbestos abatement work upon meeting the regulated area clearance criteria and fulfilling the following:
1. Remove all equipment, materials, and debris from the project area.
  2. Package and dispose of all asbestos waste as required.
  3. Repair or replace all interior finishes damaged during the abatement work.
  4. Fulfill other project closeout requirements as specified elsewhere in this specification.

**3.32 CERTIFICATE OF COMPLETION BY CONTRACTOR**

The CPIH shall complete and sign the "Certificate of Completion" in accordance with Attachment 1 at the completion of the abatement and decontamination of the regulated area.

**3.33 WORK SHIFTS**

All work shall be done during administrative hours (8:00 AM to 4:30 PM) Monday - Friday excluding Federal Holidays. Any change in the work schedule must be approved in writing by the VA Representative.

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**3.34 DISCOVERED MATERIALS**

During abatement, demolition, renovation, and/or further inspection, a potential exists for encountering materials not previously identified to become revealed. Upon discovery of a material not previously identified, the contractor shall immediately notify the owner who will arrange for and coordinate materials sample collection and analysis if necessary. The contractor is not permitted to collect any material samples for asbestos or other hazardous material analysis.

**ATTACHMENT #1**

**CERTIFICATE OF COMPLETION**

DATE:

PROJECT NAME:

VAMC/ADDRESS:

1. I certify that I have personally inspected, monitored and supervised the abatement work of (specify regulated area or Building):  
which took place from            /            /            to            /            /
2. That throughout the work all applicable requirements/regulations and the VA's specifications were met.
3. That any person who entered the regulated area was protected with the appropriate personal protective equipment and respirator and that they followed the proper entry and exit procedures and the proper operating procedures for the duration of the work.
4. That all employees of the Abatement Contractor engaged in this work were trained in respiratory protection, were experienced with abatement work, had proper medical surveillance documentation, were fit-tested for their respirator, and were not exposed at any time during the work to asbestos without the benefit of appropriate respiratory protection.
5. That I performed and supervised all inspection and testing specified and required by applicable regulations and VA specifications.
6. That the conditions inside the regulated area were always maintained in a safe and healthy condition and the maximum fiber count never exceeded 0.5 f/cc, except as described below.
7. That all glovebag work was done in accordance with OSHA requirements and the manufacturer's recommendations.

CPIH Name:

Signature/Date:

Asbestos Abatement Contractor's Name:

Signature/Date:

Contract No.    VA69D-13-C-0324  
Station Project No. 578-15-033  
Bancroft-AE Project No. 13-126

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**ATTACHMENT #2**

**CERTIFICATE OF WORKER'S ACKNOWLEDGMENT**

PROJECT NAME:

DATE:

PROJECT ADDRESS:

ABATEMENT CONTRACTOR'S NAME:

**WORKING WITH ASBESTOS CAN BE HAZARDOUS TO YOUR HEALTH. INHALING ASBESTOS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCERS. IF YOU SMOKE AND INHALE ASBESTOS FIBERS YOUR CHANCES OF DEVELOPING LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.**

Your employer's contract with the owner for the above project requires that: You must be supplied with the proper personal protective equipment including an adequate respirator and be trained in its use. You must be trained in safe and healthy work practices and in the use of the equipment found at an asbestos abatement project. You must receive/have a current medical examination for working with asbestos. These things shall be provided at no cost to you. By signing this certificate you are indicating to the owner that your employer has met these obligations.

RESPIRATORY PROTECTION: I have been trained in the proper use of respirators and have been informed of the type of respirator to be used on the above indicated project. I have a copy of the written Respiratory Protection Program issued by my employer. I have been provided for my exclusive use, at no cost, with a respirator to be used on the above indicated project.

TRAINING COURSE: I have been trained by a third party, State/EPA accredited trainer in the requirements for an AHERA/OSHA Asbestos Abatement Worker training course, 32 hours minimum duration. I currently have a valid State accreditation certificate. The topics covered in the course include, as a minimum, the following:

- Physical Characteristics and Background Information on Asbestos
- Potential Health Effects Related to Exposure to Asbestos
- Employee Personal Protective Equipment
- Establishment of a Respiratory Protection Program
- State of the Art Work Practices
- Personal Hygiene
- Additional Safety Hazards
- Medical Monitoring
- Air Monitoring
- Relevant Federal, State and Local Regulatory Requirements, Procedures, and Standards
- Asbestos Waste Disposal

MEDICAL EXAMINATION: I have had a medical examination within the past 12 months which was paid for by my employer. This examination included: health history, occupational history, pulmonary function test, and may have included a chest x-ray evaluation. The physician issued a positive written opinion after the examination.

Signature:

Printed Name:

Witness:

Contract No. VA69D-13-C-0324  
Station Project No. 578-15-033  
Bancroft-AE Project No. 13-126

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**ATTACHMENT #3**

**AFFIDAVIT OF MEDICAL SURVEILLANCE, RESPIRATORY PROTECTION AND  
TRAINING/ACCREDITATION**

VA PROJECT NAME AND NUMBER:

VA MEDICAL FACILITY:

ABATEMENT CONTRACTOR'S NAME AND ADDRESS:

1. I verify that the following individual

Name:

who is proposed to be employed in asbestos abatement work associated with the above project by the named Abatement Contractor, is included in a medical surveillance program in accordance with 29 CFR 1926.1101(m), and that complete records of the medical surveillance program as required by 29 CFR 1926.1101(m)(n) and 29 CFR 1910.20 are kept at the offices of the Abatement Contractor at the following address.

Address:

2. I verify that this individual has been trained, fit-tested and instructed in the use of all appropriate respiratory protection systems and that the person is capable of working in safe and healthy manner as expected and required in the expected work environment of this project.
3. I verify that this individual has been trained as required by 29 CFR 1926.1101(k). This individual has also obtained a valid State accreditation certificate. Documentation will be kept on-site.
4. I verify that I meet the minimum qualifications criteria of the VA specifications for a CPIH.

Signature of CPIH:

Date:

Printed Name of CPIH:

Signature of Contractor:

Date:

Printed Name of Contractor:



**ATTACHMENT #4**

ABATEMENT CONTRACTOR/COMPETENT PERSON(S) REVIEW AND ACCEPTANCE OF THE VA'S  
ASBESTOS SPECIFICATIONS

VA Project Location:

VA Project #:

VA Project Description:

This form shall be signed by the Asbestos Abatement Contractor Owner and the Asbestos Abatement Contractor's Competent Person(s) prior to any start of work at the VA related to this Specification. If the Asbestos Abatement Contractor's/Competent Person(s) has not signed this form, they shall not be allowed to work on-site.

I, the undersigned, have read VA's Asbestos Specification regarding the asbestos abatement requirements. I understand the requirements of the VA's Asbestos Specification and agree to follow these requirements as well as all required rules and regulations of OSHA/EPA/DOT and State/Local requirements. I have been given ample opportunity to read the VA's Asbestos Specification and have been given an opportunity to ask any questions regarding the content and have received a response related to those questions. I do not have any further questions regarding the content, intent and requirements of the VA's Asbestos Specification.

At the conclusion of the asbestos abatement, I will certify that all asbestos abatement work was done in accordance with the VA's Asbestos Specification and all ACM was removed properly and no fibrous residue remains on any abated surfaces.

Abatement Contractor Owner's Signature \_\_\_\_\_ Date \_\_\_\_\_

Abatement Contractor Competent Person(s)	Date
------------------------------------------	------

Date

Date \_\_\_\_\_

- - - END- - - -



**DIVISION 03**

**CONCRETE**



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**SECTION 03 30 53**  
**(SHORT-FORM) CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies cast-in-place structural concrete and material and mixes for other concrete.

**1.2 RELATED WORK:**

- A. Concrete roads, walks, and similar exterior site work: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.

**1.3 TOLERANCES:**

- A. ACI 117.
- B. Slab Finishes: ACI 117, F-number method in accordance with ASTM E1155.

**1.4 REGULATORY REQUIREMENTS:**

- A. ACI SP-66 ACI Detailing Manual
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.

**1.5 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Concrete Mix Design.
- C. Shop Drawings: Reinforcing steel: Complete shop drawings.
- D. Manufacturer's Certificates: Air-entraining admixture, chemical admixtures, curing compounds.

**1.6 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Concrete Institute (ACI):
  - 117-10.....Specification for Tolerances for Concrete Construction, Materials and Commentary
  - 211.1-91(R2009).....Standard Practice for Proportions for Normal, Heavyweight, and Mass Concrete
  - 211.2-98(R2004).....Standard Practice for Selecting Proportions for Structural Lightweight Concrete
  - 301-10.....Specifications for Structural Concrete
  - 305.1-06.....Specification for Hot Weather Concreting

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306.1-90(R2002).....Standard Specification for Cold Weather  
Concreting

SP-66-04 .....ACI Detailing Manual

318-11.....Building Code Requirements for Structural  
Concrete and Commentary

347-04.....Guide to Formwork for Concrete

C. American Society for Testing And Materials (ASTM):

A185/A185M-07.....Standard Specification for Steel Welded Wire  
Reinforcement, Plain, for Concrete Reinforcement

A615/A615M-09.....Standard Specification for Deformed and Plain  
Carbon Steel Bars for Concrete Reinforcement

A996/A996M-09.....Standard Specification for Rail Steel and Axle  
Steel Deformed Bars for Concrete Reinforcement

C31/C31M-10.....Standard Practice for Making and Curing Concrete  
Test Specimens in the Field

C33/C33M-11a.....Standard Specification for Concrete Aggregates

C39/C39M-12.....Standard Test Method for Compressive Strength of  
Cylindrical Concrete Specimens

C94/C94M-12.....Standard Specification for Ready Mixed Concrete

C143/C143M-10.....Standard Test Method for Slump of Hydraulic  
Cement Concrete

C150-11.....Standard Specification for Portland Cement

C171-07.....Standard Specification for Sheet Material for  
Curing Concrete

C172-10.....Standard Practice for Sampling Freshly Mixed  
Concrete

C173-10.....Standard Test Method for Air Content of Freshly  
Mixed Concrete by the Volumetric Method

C192/C192M-07.....Standard Practice for Making and Curing Concrete  
Test Specimens in the Laboratory

C231-10.....Standard Test Method for Air Content of Freshly  
Mixed Concrete by the Pressure Method

C260-10.....Standard Specification for Air-Entraining  
Admixtures for Concrete

C330-09.....Standard Specification for Lightweight  
Aggregates for Structural Concrete

C494/C494M-11.....Standard Specification for Chemical Admixtures  
for Concrete

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C618-12.....Standard Specification for Coal Fly Ash and Raw  
or Calcined Natural Pozzolan for Use in Concrete  
D1751-04(R2008) .....Standard Specification for Preformed Expansion  
Joint Fillers for Concrete Paving and Structural  
Construction (Non-extruding and Resilient  
Bituminous Types)  
D4397-10.....Standard Specification for Polyethylene Sheeting  
for Construction, Industrial and Agricultural  
Applications  
E1155-96(2008).....Standard Test Method for Determining  $F_F$  Floor  
Flatness and  $F_L$  Floor Levelness Numbers

**PART 2 - PRODUCTS**

**2.1 FORMS:**

Wood, plywood, metal, or other materials, approved by COR, of grade or  
type suitable to obtain type of finish specified.

**2.2 MATERIALS:**

- A. Portland Cement: ASTM C150, Type I or II.
- B. Fly Ash: ASTM C618, Class C or F including supplementary optional  
requirements relating to reactive aggregates and alkalis, and loss on  
ignition (LOI) not to exceed 5 percent.
- C. Coarse Aggregate: ASTM C33, Size 67. Size 467 may be used for footings  
and walls over 300 mm (12 inches) thick. Coarse aggregate for applied  
topping and metal pan stair fill shall be Size 7.
- D. Fine Aggregate: ASTM C33.
- E. Lightweight Aggregate for Structural Concrete: ASTM C330, Table 1
- F. Mixing Water: Fresh, clean, and potable.
- G. Air-Entraining Admixture: ASTM C260.
- H. Chemical Admixtures: ASTM C494.
- I. Vapor Barrier: ASTM D4397, .
- J. Reinforcing Steel: ASTM A615 or ASTM A996, deformed. See structural  
drawings for grade.
- K. Welded Wire Fabric: ASTM A185.
- L. Expansion Joint Filler: ASTM D1751.
- M. Sheet Materials for Curing Concrete: ASTM C171.
- N. Abrasive Aggregates: Aluminum oxide grains or emery grits.
- O. Liquid Hardener and Dustproofer: Fluosilicate solution or magnesium  
fluosilicate or zinc fluosilicate. Magnesium and zinc may be used  
separately or in combination as recommended by manufacturer.

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P. Liquid Densifier/Sealer: 100 percent active colorless aqueous silicate solution.

Q. Grout, Non-Shrinking: Premixed ferrous or non-ferrous, mixed and applied in accordance with manufacturer's recommendations. Grout shall show no settlement or vertical drying shrinkage at 3 days or thereafter based on initial measurement made at time of placement, and produce a compressive strength of at least 18mpa (2500 psi) at 3 days and 35mpa (5000 psi) at 28 days.

**2.3 CONCRETE MIXES:**

- A. Design of concrete mixes using materials specified shall be the responsibility of the Contractor as set forth under Option C of ASTM C94.
- B. Compressive strength at 28 days shall be not less than 4000 psi.
- C. Establish strength of concrete by testing prior to beginning concreting operation. Test consists of average of three cylinders made and cured in accordance with ASTM C192 and tested in accordance with ASTM C39.
- D. Maximum slump for vibrated concrete is 4 inches tested in accordance with ASTM C143.
- E. Cement and water factor (See Table I):

**TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE**

Concrete: Strength	Non-Air-Entrained		Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/m <sup>3</sup> (lbs/c. yd)	Max. Water Cement Ratio	Min. Cement kg/m <sup>3</sup> (lbs/c. yd)	Max. Water Cement Ratio
35 (5000) <sup>1,3</sup>	375 (630)	0.45	385 (650)	0.40
30 (4000) <sup>1,3</sup>	325 (550)	0.55	340 (570)	0.50
25 (3000) <sup>1,3</sup>	280 (470)	0.65	290 (490)	0.55
25 (3000) <sup>1,2</sup>	300 (500)	*	310 (520)	*

1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 8.3 MPa (1200 psi) in excess of f'c. For concrete strengths above 35 Mpa (5000 psi), the proposed mix design shall achieve a compressive strength 9.7 MPa (1400 psi) in excess of f'c.
2. Lightweight Structural Concrete. Pump mixes may require higher cement values.



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3. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.
  4. Determined by Laboratory in accordance with ACI 211.1 for normal concrete or ACI 211.2 for lightweight structural concrete.
- F. Air-entrainment is required for all exterior concrete and as required for Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS. Air content shall conform with the following tables:

**TABLE I - TOTAL AIR CONTENT  
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)**

Nominal Maximum Size of Coarse Aggregate	Total Air Content Percentage by Volume
10 mm (3/8 in)	6 to 10
13 mm (1/2 in)	5 to 9
19 mm (3/4 in)	4 to 8
25 mm (1 in)	3 1/2 to 6 1/2
40 mm (1 1/2 in)	3 to 6

**TABLE II TOTAL AIR CONTENT  
AIR CONTENT OF LIGHTWEIGHT STRUCTURAL CONCRETE**

Nominal Maximum size of Total Air Content	Coarse Aggregate, mm's (Inches) Percentage by Volume
Greater than 10 mm (3/8 in) 4 to 8	10 mm (3/8 in) or less 5 to 9

**2.4 BATCHING & MIXING:**

- A. Store, batch, and mix materials as specified in ASTM C94.
1. Job-Mixed: Concrete mixed at job site shall be mixed in a batch mixer in manner specified for stationary mixers in ASTM C94.
  2. Ready-Mixed: Ready-mixed concrete comply with ASTM C94, except use of non-agitating equipment for transporting concrete to the site will not be permitted. With each load of concrete delivered to project, ready-mixed concrete producer shall furnish, in duplicate, certification as required by ASTM C94.
  3. Mixing structural lightweight concrete: Charge mixer with 2/3 of total mixing water and all of the aggregate. Mix ingredients for not less than 30 seconds in a stationary mixer or not less than 10 revolutions at mixing speed in a truck mixer. Add remaining mixing water and other ingredients and continue mixing. Above procedure may be modified as recommended by aggregate producer.

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**PART 3 - EXECUTION**

**3.1 FORMWORK:**

- A. Installation conform to ACI 347. Sufficiently tight to hold concrete without leakage, sufficiently braced to withstand vibration of concrete, and to carry, without appreciable deflection, all dead and live loads to which they may be subjected.
- B. Treating and Wetting: Treat or wet contact forms as follows:
  - 1. Coat plywood and board forms with non-staining form sealer. In hot weather cool forms by wetting with cool water just before concrete is placed.
  - 2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather cool metal forms by thoroughly wetting with water just before placing concrete.
  - 3. Use sealer on reused plywood forms as specified for new material.
- C. Inserts, sleeves, and similar items: Flashing reglets, masonry ties, anchors, inserts, wires, hangers, sleeves, boxes for floor hinges and other items specified as furnished under this and other sections of specifications and required to be in their final position at time concrete is placed shall be properly located, accurately positioned and built into construction, and maintained securely in place.
- D. Construction Tolerances:
  - 1. Contractor is responsible for setting and maintaining concrete formwork to assure erection of completed work within tolerances specified to accommodate installation or other rough and finish materials. Remedial work necessary for correcting excessive tolerances is the responsibility of the Contractor. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Government.
  - 2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

**3.2 REINFORCEMENT:**

Details of concrete reinforcement, unless otherwise shown, in accordance with ACI 318 and ACI SP-66. Support and securely tie reinforcing steel to prevent displacement during placing of concrete.

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**3.3 VAPOR BARRIER:**

- A. Except where membrane waterproofing is required, place interior concrete slabs on a continuous vapor barrier.
- B. Place 100 mm (4 inches) of fine granular fill over the vapor barrier to act as a blotter for concrete slab.
- C. Lap joints 150 mm (6 inches) and seal with a compatible pressure-sensitive tape.
- D. Patch punctures and tears.

**3.4 PLACING CONCRETE:**

- A. Remove water from excavations before concrete is placed. Remove hardened concrete, debris and other foreign materials from interior of forms, and from inside of mixing and conveying equipment. Obtain approval of COR before placing concrete. Provide screeds at required elevations for concrete slabs.
- B. Before placing new concrete on or against concrete which has set, existing surfaces shall be roughened and cleaned free from all laitance, foreign matter, and loose particles.
- C. Convey concrete from mixer to final place of deposit by method which will prevent segregation or loss of ingredients. Do not deposit in work concrete that has attained its initial set or has contained its water or cement more than 1 1/2 hours. Do not allow concrete to drop freely more than 1500 mm (5 feet) in unexposed work nor more than 900 mm (3 feet) in exposed work. Place and consolidate concrete in horizontal layers not exceeding 300 mm (12 inches) in thickness. Consolidate concrete by spading, rodding, and mechanical vibrator. Do not secure vibrator to forms or reinforcement. Vibration shall be carried on continuously with placing of concrete.
- D. Hot weather placing of concrete: Follow recommendations of ACI 305R to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete.
- E. Cold weather placing of concrete: Follow recommendations of ACI 306R, to prevent freezing of thin sections less than 300 mm (12 inches) and to permit concrete to gain strength properly, except that use of calcium chloride shall not be permitted without written approval from COR.

**3.5 PROTECTION AND CURING:**

Protect exposed surfaces of concrete from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperature. Curing method shall be subject to approval by COR.

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**3.6 FORM REMOVAL:**

Forms remain in place until concrete has a sufficient strength to carry its own weight and loads supported. Removal of forms at any time is the Contractor's sole responsibility.

**3.7 SURFACE PREPARATION:**

Immediately after forms have been removed and work has been examined and approved by COR, remove loose materials, and patch all stone pockets, surface honeycomb, or similar deficiencies with cement mortar made with 1 part portland cement and 2 to 3 parts sand.

**3.8 FINISHES:**

A. Vertical and Overhead Surface Finishes:

1. Unfinished Areas: Vertical and overhead concrete surfaces exposed in unfinished areas, above suspended ceilings in manholes, and other unfinished areas exposed or concealed will not require additional finishing.
2. Interior and Exterior Exposed Areas (to be painted): Fins, burrs and similar projections on surface shall be knocked off flush by mechanical means approved by COR and rubbed lightly with a fine abrasive stone or hone. Use an ample amount of water during rubbing without working up a lather of mortar or changing texture of concrete.
3. Interior and Exterior Exposed Areas (finished): Finished areas, unless otherwise shown, shall be given a grout finish of uniform color and shall have a smooth finish treated as follows:
  - a. After concrete has hardened and laitance, fins and burrs have been removed, scrub concrete with wire brushes. Clean stained concrete surfaces by use of a hone or stone.
  - b. Apply grout composed of 1 part portland cement and 1 part clean, fine sand (smaller than 600 micro-m (No. 30) sieve). Work grout into surface of concrete with cork floats or fiber brushes until all pits and honeycomb are filled.
  - c. After grout has hardened, but still plastic, remove surplus grout with a sponge rubber float and by rubbing with clean burlap.
  - d. In hot, dry weather use a fog spray to keep grout wet during setting period. Complete finish for any area in same day. Confine limits of finished areas to natural breaks in wall surface. Do not leave grout on concrete surface overnight.

B. Slab Finishes:

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1. Scratch Finish: Slab surfaces to receive a bonded applied cementitious application shall all be thoroughly raked or wire broomed after partial setting (within 2 hours after placing) to roughen surface to insure a permanent bond between base slab and applied cementitious materials.

2. Finished slab flatness (FF) and levelness (FL) values comply with the following minimum requirements:

Slab on grade & Shored suspended slabs		Unshored suspended slabs	
Specified overall value	F <sub>F</sub> 25/F <sub>L</sub> 20	Specified overall value	F <sub>F</sub> 25
Minimum local value	F <sub>F</sub> 17/F <sub>L</sub> 15	Minimum local value	F <sub>F</sub> 17

**3.9 SURFACE TREATMENTS:**

- A. Surface treatments shall be mixed and applied in accordance with manufacturer's printed instructions.
- B. Liquid Densifier/Sealer: Use on all exposed concrete floors and concrete floors to receive carpeting except those specified to receive non-slip finish.

**3.10 APPLIED TOPPING:**

- A. Separate concrete topping with thickness and strength shown with only enough water to insure a stiff, workable, plastic mix.
- B. Continuously place applied topping until entire section is complete, struck off with straightedge, compact by rolling or tamping, float and steel trowel to a hard smooth finish.

**3.11 RESURFACING FLOORS: (NOT USED)**

**3.12 RETAINING WALLS:**

- A. Concrete for retaining walls shall be as shown and air-entrained.
- B. Install and construct expansion and contraction joints, waterstops, weep holes, reinforcement and railing sleeves as shown.
- C. Finish exposed surfaces to match adjacent concrete surfaces, new or existing.
- D. Porous backfill shall be placed as shown.

**3.13 PRECAST CONCRETE ITEMS: (NOT USED)**

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**DIVISION 05**

**METALS**





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**SECTION 05 12 00**  
**STRUCTURAL STEEL FRAMING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies structural steel shown and classified by Section 2, Code of Standard Practice for Steel Buildings and Bridges.

**1.2 RELATED WORK:**

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Painting: Section 09 91 00, PAINTING.
- C. Steel Joist: Section 05 21 00, STEEL JOIST FRAMING.
- D. Steel Decking: Section 05 31 00, STEEL DECKING.
- E. Composite Steel Deck: Section 05 36 00, COMPOSITE METAL DECKING.
- F. Fireproofing: Section 07 81 00, APPLIED FIREPROOFING.

**1.3 QUALITY ASSURANCE:**

- A. Fabricator and erector shall maintain a program of quality assurance in conformance with Section 8, Code of Standard Practice for Steel Buildings and Bridges. Work shall be fabricated in an AISC certified Category Std fabrication plant.
- B. Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector is provided with the written notification required by 29 CFR 1926.752. Provide copy of this notification to the COR.

**1.4 TOLERANCES:**

Fabrication tolerances for structural steel shall be held within limits established by ASTM A6, by AISC 303, Sections 6 and 7, Code of Standard Practice for Buildings and Bridges, except as follows:

- A. Elevation tolerance for closure plates at the building perimeter and at slab openings prior to concrete placement is 6 mm (1/4 inch).

**1.5 DESIGN:**

- A. Connections: Connection details are indicated on the contract drawings. All connections shall meet the requirements of AISC 360-05. Promptly notify COR of any locations where connection design is not indicated.

**1.6 REGULATORY REQUIREMENTS:**

- A. AISC 360: Specification for Structural Steel Buildings
- B. AISC 303: Code of Standard Practice for Steel Buildings and Bridges.

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**1.7 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop and Erection Drawings: Complete
- C. Certificates:
  - 1. Structural steel.
  - 2. Steel for all connections.
  - 3. Welding materials.
  - 4. Shop coat primer paint.
- D. Test Reports:
  - 1. Welders' qualifying tests.
- E. Record Surveys.

**1.8 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Institute of Steel Construction (AISC):
  - 1. AISC 360-10 Specification for Structural Steel Buildings
  - 3. AISC 303-10 Code of Standard Practice for Steel Buildings and Bridges
- C. American National Standards Institute (ANSI):
  - B18.22.1-65(R2008).....Plain Washers
  - B18.22M-81(R2000).....Metric Plain Washers
- D. American Society for Testing and Materials (ASTM):
  - A6/A6M-11.....Standard Specification for General Requirements  
for Rolled Structural Steel Bars, Plates,  
Shapes, and Sheet Piling
  - A36/A36M-08.....Standard Specification for Carbon Structural  
Steel
  - A53/A53M-10.....Standard Specification for Pipe, Steel, Black  
and Hot-Dipped, Zinc-Coated Welded and Seamless
  - A123/A123M-09.....Standard Specification for Zinc (Hot-Dip  
Galvanized) Coatings on Iron and Steel Products
  - A242/A242M-04(R2009)....Standard Specification for High-Strength Low-  
Alloy Structural Steel
  - A283/A283M-03(R2007)....Standard Specification for Low and Intermediate  
Tensile Strength Carbon Steel Plates
  - A307-10.....Standard Specification for Carbon Steel Bolts  
and Studs, 60,000 psi Tensile Strength

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- A325-10.....Standard Specification for Structural Bolts,  
Steel, Heat Treated, 120/105 ksi Minimum Tensile  
Strength
- A490-12.....Standard Specification for Heat-Treated Steel  
Structural Bolts 150 ksi Minimum Tensile  
Strength
- A500/A500M-10a.....Standard Specification for Cold Formed Welded  
and Seamless Carbon Steel Structural Tubing in  
Rounds and Shapes
- A501-07.....Standard Specification for Hot-Formed Welded and  
Seamless Carbon Steel Structural Tubing
- A572/A572M-07.....Standard Specification for High-Strength  
Low-Alloy Columbium-Vanadium Structural Steel
- A992/A992M-11.....Standard Specification for Structural Steel  
Shapes
- E. American Welding Society (AWS):  
D1.1/D1.1M-10.....Structural Welding Code-Steel
- F. Research Council on Structural Connections (RCSC) of The Engineering  
Foundation:  
Specification for Structural Joints Using ASTM A325 or A490 Bolts
- G. Military Specifications (Mil. Spec.):  
MIL-P-21035.....Paint, High Zinc Dust Content, Galvanizing,  
Repair
- H. Occupational Safety and Health Administration (OSHA):  
29 CFR Part 1926-2001...Safety Standards for Steel Erection

**PART 2 - PRODUCTS**

**2.1 MATERIALS:**

- A. Structural Steel: ASTM A36, A992 (wide flange shapes).
- B. Structural Tubing: ASTM A500, Grade B.
- C. Structural Tubing: ASTM A501.
- D. Steel Pipe: ASTM A53, Grade B.
- E. Bolts, Nuts and Washers:  
1. High-strength bolts, including nuts and washers: ASTM A325.  
2. Bolts and nuts, other than high-strength: ASTM A307, Grade A.  
3. Plain washers, other than those in contact with high-strength bolt  
heads and nuts: ANSI Standard B18.22.1.
- F. Zinc Coating: ASTM A123.

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G. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035.

**PART 3 - EXECUTION**

**3.1 CONNECTIONS (SHOP AND FIELD):**

- A. Welding: Welding in accordance with AWS D1.1. Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in AWS D1.1 to perform type of work required.
- B. High-Strength Bolts: High-strength bolts tightened to a bolt tension not less than 70% of their minimum tensile strength. Tightening done with properly calibrated wrenches, by turn-of-nut method or by use of direct tension indicators (bolts or washers). Tighten bolts in connections identified as slip-critical using Direct Tension Indicators. Twist-off torque bolts are not an acceptable alternate fastener for slip critical connections.

**3.2 FABRICATION:**

- A. Fabrication in accordance with Chapter M, AISC 360. .

**3.3 SHOP PAINTING:**

- A. General: Shop paint steel with primer in accordance with AISC 303, Section 6.
- B. Shop paint for steel surfaces is specified in Section 09 91 00, PAINTING.
- C. Do not apply paint to following:
  - 1. Surfaces within 50 mm (2 inches) of joints to be welded in field.
  - 2. Surfaces which will be encased in concrete.
  - 3. Surfaces which will receive sprayed on fireproofing.
  - 4. Top flange of members which will have shear connector studs applied.
- D. Structural steel in the interstitial space that does not receive sprayed on fireproofing shall be painted with primer in accordance with general requirement of shop painting.
- E. Zinc Coated (Hot Dip Galvanized) per ASTM A123 (after fabrication):  
Touch-up after erection: Clean and wire brush any abraded and other spots worn through zinc coating, including threaded portions of bolts and welds and touch-up with galvanizing repair paint.
- F. Provide fireproofing for all steel requiring it per code.

**3.4 ERECTION:**

- A. General: Erection in accordance with AISC 303, Section 7B. Temporary Supports: Temporary support of structural steel frames during erection in accordance with AISC 303, Section 7

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**3.5 FIELD PAINTING:**

- A. After erection, touch-up steel surfaces specified to be shop painted. After welding is completed, clean and prime areas not painted due to field welding.
- B. Finish painting of steel surfaces is specified in Section 09 91 00, PAINTING.

**3.6 SURVEY:**

- A. Upon completion of finish bolting or welding on any part of the work, and prior to start of work by other trades that may be supported, attached, or applied to the structural steel work, submit a certified report of survey to COR for approval. Reports shall be prepared by Registered Land Surveyor or Registered Civil Engineer as specified in Section 01 00 00, GENERAL REQUIREMENTS. Report shall specify that location of structural steel is acceptable for plumbness, level and alignment within specified tolerances specified in the AISC Manual.

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**SECTION 05 50 00**  
**METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.
- B. Items specified.
  - 1. Support for Wall and Ceiling Mounted Items: (SD055000-01, SD055000-02, SD102113-01, SD102600-01, SD123100-01 & SD123100-02)
  - 2. Frames:
  - 3. Guards
  - 4. Loose Lintels
  - 5. Greeting
  - 6. Shelf Angles
  - 7. Gas Racks
  - 8. Plate Door Sill
  - 9. Safety Nosings
  - 10. Ladders
  - 11. Railings:
  - 12. Catwalks and Platforms
  - 13. Trap Doors with Ceiling Hatch
  - 14. Sidewalk Access Doors
  - 15. Screened Access Doors
  - 16. Steel Counter or Bench Top Frame and Leg

**1.2 RELATED WORK**

- A. Railings attached to steel stairs: Section 05 51 00, METAL STAIRS.
- B. Colors, finishes, and textures: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Prime and finish painting: Section 09 91 00, PAINTING.
- D. Stainless steel corner guards: Section 10 26 00, WALL AND DOOR PROTECTION.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

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B. Manufacturer's Literature and Data:

Grating, each type	Floor plate
Trap door	Wheel guards
Ceiling hatch	Sidewalk Access door
Manhole Covers	Safety nosing

C. Shop Drawings:

1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
3. Provide templates and rough-in measurements as required.

D. Manufacturer's Certificates:

1. Anodized finish as specified.
2. Live load designs as specified.

E. Design Calculations for specified live loads including dead loads signed and sealed by Arizona Professional Engineer

F. Furnish setting drawings and instructions for installation of anchors to be preset into concrete and masonry work, and for the positioning of items having anchors to be built into concrete or masonry construction.

**1.4 QUALITY ASSURANCE**

- A. Each manufactured product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- B. Each product type shall be the same and be made by the same manufacturer.
- C. Assembled product to the greatest extent possible before delivery to the site.
- D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

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**1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Mechanical Engineers (ASME):  
B18.6.1-97.....Wood Screws  
B18.2.2-87(R2005).....Square and Hex Nuts
- C. American Society for Testing and Materials (ASTM):  
A36/A36M-12.....Structural Steel  
A47-99(R2009).....Malleable Iron Castings  
A48-03(R2012).....Gray Iron Castings  
A53-12.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated  
Welded and Seamless  
A123-12.....Zinc (Hot-Dip Galvanized) Coatings on Iron and  
Steel Products  
A240/A240M-14.....Standard Specification for Chromium and  
Chromium-Nickel Stainless Steel Plate, Sheet  
and Strip for Pressure Vessels and for General  
Applications.  
A269-10.....Seamless and Welded Austenitic Stainless Steel  
Tubing for General Service  
A307-12.....Carbon Steel Bolts and Studs, 60,000 PSI  
Tensile Strength  
A391/A391M-07(R2012)....Grade 80 Alloy Steel Chain  
A786/A786M-09.....Rolled Steel Floor Plate  
B221-13.....Aluminum and Aluminum-Alloy Extruded Bars,  
Rods, Wire, Shapes, and Tubes  
B456-11.....Electrodeposited Coatings of Copper Plus Nickel  
Plus Chromium and Nickel Plus Chromium  
B632-08.....Aluminum-Alloy Rolled Tread Plate  
C1107-13.....Packaged Dry, Hydraulic-Cement Grout  
(Nonshrink)  
D3656-13.....Insect Screening and Louver Cloth Woven from  
Vinyl-Coated Glass Yarns  
F436-11.....Hardened Steel Washers



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F468-06(R2012).....Nonferrous Bolts, Hex Cap Screws, Socket Head

Cap Screws and Studs for General Use

F593-13.....Stainless Steel Bolts, Hex Cap Screws, and  
Studs

F1667-11.....Driven Fasteners: Nails, Spikes and Staples

D. American Welding Society (AWS):

D1.1-10.....Structural Welding Code Steel

D1.2-08.....Structural Welding Code Aluminum

D1.3-08.....Structural Welding Code Sheet Steel

E. National Association of Architectural Metal Manufacturers (NAAMM)

AMP 521-01.....Pipe Railing Manual

AMP 500-06.....Metal Finishes Manual

MBG 531-09.....Metal Bar Grating Manual

MBG 532-09.....Heavy Duty Metal Bar Grating Manual

F. Structural Steel Painting Council (SSPC)/Society of Protective  
Coatings:

SP 1-04.....No. 1, Solvent Cleaning

SP 2-04.....No. 2, Hand Tool Cleaning

SP 3-04.....No. 3, Power Tool Cleaning

G. Federal Specifications (Fed. Spec):

RR-T-650E.....Treads, Metallic and Nonmetallic, Nonskid

**PART 2 - PRODUCTS**

**2.1 DESIGN CRITERIA**

- A. In addition to the dead loads, design fabrications to support the following live loads unless otherwise specified.
- B. Ladders and Rungs: 120 kg (300 pounds) at any point.
- C. Railings and Handrails: 900 N (200 pounds) in any direction at any point.
- D. Floor Plates, Gratings, Covers, Trap Doors, Catwalks, and Platforms: 100 pounds per square foot. Use 1000 pounds for concentrated loads. E. Manhole Covers: 250 pounds per square foot.

**2.2 MATERIALS**

- A. Structural Steel: ASTM A36.
- B. Stainless Steel: ASTM A240, Type 302 or 304.

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- C. Aluminum, Extruded: ASTM B221, Alloy 6063-T5 unless otherwise specified. For structural shapes use alloy 6061-T6 and alloy 6061-T4511.
- D. Floor Plate:
  - 1. Steel ASTM A786.
  - 2. Aluminum: ASTM B632.
- E. Steel Pipe: ASTM A53.
  - 1. Galvanized for exterior locations.
  - 2. Type S, Grade A unless specified otherwise.
  - 3. NPS (inside diameter) as shown.
- F. Cast-Iron: ASTM A48, Class 30, commercial pattern.
- G. Malleable Iron Castings: A47.
- H. Primer Paint: As specified in Section 09 91 00, PAINTING.
- I. Stainless Steel Tubing: ASTM A269, type 302 or 304.
- J. Modular Channel Units:
  - 1. Factory fabricated, channel shaped, cold formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
  - 2. Form channel within turned pyramid shaped clamping ridges on each side.
  - 3. Provide case hardened steel nuts with serrated grooves in the top edges designed to be inserted in the channel at any point and be given a quarter turn so as to engage the channel clamping ridges. Provide each nut with a spring designed to hold the nut in place.
  - 4. Factory finish channels and parts with oven baked primer when exposed to view. Channels fabricated of ASTM A525, G90 galvanized steel may have primer omitted in concealed locations. Finish screws and nuts with zinc coating.
  - 5. Fabricate snap-in closure plates to fit and close exposed channel openings of not more than 0.0125 inch thick stainless steel.
- K. Grout: ASTM C1107, pourable type.
- L. Insect Screening: ASTM D3656.

**2.3 HARDWARE**

- A. Rough Hardware:
  - 1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated,

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or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.

2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal or stainless is used.

**B. Fasteners:**

**1. Bolts with Nuts:**

- a. ASTM A325 and ASME B18
- b. ASTM A307 for 415 MPa (60,000 psi) tensile strength bolts.
- c. ASTM F468 for nonferrous bolts.
- d. ASTM F593 for stainless steel.

**2. Screws: ASME B18.6.1.**

**3. Washers: ASTM F436, type to suit material and anchorage.**

**4. Nails: ASTM F1667, Type I, style 6 or 14 for finish work.**

**2.4 FABRICATION GENERAL**

**A. Material**

1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
2. Use material free of defects which could affect the appearance or service ability of the finished product.

**B. Size:**

1. Size and thickness of members as shown.
2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

**C. Connections**

1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
2. Field riveting will not be approved.
3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.

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5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable members machine screws or bolts.

**D. Fasteners and Anchors**

1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.
5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self drilling and tapping screws or bolts.

**E. Workmanship**

1. General:
  - a. Fabricate items to design shown.
  - b. Furnish members in longest lengths commercially available within the limits shown and specified.
  - c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
  - d. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items.

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- e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
  - f. Prepare members for the installation and fitting of hardware.
  - g. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits and similar items. Provide reinforcement to support cut edges.
  - h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
2. Welding:
- a. Weld in accordance with AWS.
  - b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
  - c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
  - d. Finish welded joints to match finish of adjacent surface.
3. Joining:
- a. Miter or butt members at corners.
  - b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
4. Anchors:
- a. Where metal fabrications are shown to be preset in concrete, weld 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 150 mm (6 inches) long with 25 mm (one inch) hooked end, to back of member at 600 mm (2 feet) on center, unless otherwise shown.
  - b. Where metal fabrications are shown to be built into masonry use 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 250 mm (10 inches) long with 50 mm (2 inch) hooked end, welded to back of member at 600 mm (2 feet) on center, unless otherwise shown.
5. Cutting and Fitting:
- a. Accurately cut, machine and fit joints, corners, copes, and miters.
  - b. Fit removable members to be easily removed.
  - c. Design and construct field connections in the most practical place for appearance and ease of installation.

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- d. Fit pieces together as required.
- e. Fabricate connections for ease of assembly and disassembly without use of special tools.
- f. Joints firm when assembled.
- g. Conceal joining, fitting and welding on exposed work as far as practical.
- h. Do not show rivets and screws prominently on the exposed face.
- i. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.

**F. Finish:**

- 1. Finish exposed surfaces in accordance with NAAMM AMP 500 Metal Finishes Manual.
- 2. Aluminum: NAAMM AMP 501.
  - a. Mill finish, AA-M10, as fabricated, use unless specified otherwise.
  - b. Clear anodic coating, AA-C22A41, chemically etched medium matte, with Architectural Class 1, 0.7 mils or thicker.
  - c. Colored anodic coating, AA-C22A42, chemically etched medium matte with Architectural Class 1, 0.7 mils or thicker.
  - d. Painted: AA-C22R10.
- 3. Steel and Iron: NAAMM AMP 504.
  - a. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.
  - b. Surfaces exposed in the finished work:
    - 1) Finish smooth rough surfaces and remove projections.
    - 2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.
  - c. Shop Prime Painting:
    - 1) Surfaces of Ferrous metal:
      - a) Items not specified to have other coatings.
      - b) Galvanized surfaces specified to have prime paint.
      - c) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.

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- d) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
- e) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.
- 2) Non ferrous metals: Comply with MAAMM-500 series.
- 4. Stainless Steel: NAAMM AMP-504 Finish No. 4.
- 5. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.
- G. Protection:
  - 1. Insulate aluminum surfaces that will come in contact with concrete, masonry, plaster, or metals other than stainless steel, zinc or white bronze by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.
  - 2. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

**2.5 SUPPORTS**

- A. General:
  - 1. Fabricate ASTM A36 structural steel shapes as shown.
  - 2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
  - 3. Field connections may be welded or bolted.
- B. For Ceiling Hung Toilet Stall:
  - 1. Use a continuous steel channel above pilasters with hangers centered over pilasters.
  - 2. Make provision for installation of stud bolts in lower flange of channel.
  - 3. Provide a continuous steel angle at wall and channel braces spaced as shown.
  - 4. Use threaded rod hangers.
  - 5. Provide diagonal angle brace where the suspended ceiling over toilet stalls does not extend to side wall of room.
  - 6. Provide supports for ceiling hung pilasters at dressing booths and entrance screen to toilet room similar to support for toilet stall pilasters.

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C. For Wall Mounted Items:

1. For items supported by metal stud partitions.
2. Steel strip or hat channel minimum of 1.5 mm (0.0598 inch) thick.
3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.
4. Steel hat channels where shown. Flange cut and flattened for anchorage to stud.
5. Structural steel tube or channel for grab bar at water closets floor to structure above with clip angles or end plates formed for anchors.
6. Use steel angles for thru wall counters. Drill angle for fasteners at ends and not over 100 mm (4 inches) on center between ends.

D. For Trapeze Bars:

1. Construct assembly above ceilings as shown and design to support not less than a 340 kg (750 pound) working load at any point.
2. Fabricate trapeze supports as shown, with all exposed members, including screws, nuts, bolts and washers, fabricated of stainless steel.
3. Fabricate concealed components of structural steel shapes unless shown otherwise.
4. Stainless steel ceiling plate drilled for eye bolt.
5. Continuously weld connections where welds shown.
6. Use modular channel where shown with manufacturers bolts and fittings.
  - a. Weld ends of steel angle braces to steel plates and secure to modular channel units as shown. Drill plates for anchor bolts.
  - b. Fabricate eye bolt, special clamp bolt, and plate closure full length of modular channel at ceiling line and secure to modular channel unit with manufacturers standard fittings.

E. For Intravenous Track and Cubical Curtain Track:

1. Fabricate assembly of steel angle as shown.
2. Drill angle bent ends for anchor screws to acoustical suspension system and angle for hanger wires.
3. Provide pipe sleeve welded to angle.

F. Supports at Ceiling for Radiographic (x-ray) Equipment:



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1. Fabricate hangers braces, and track of modular channel units assembly as shown.
  2. Fabricate steel plates for anchor to structure above.
  3. Drill bent plates for bolting at mid height at concrete beams.
- G. For Operating Room Light:
1. Fabricate as shown to suit equipment furnished.
  2. Drill leveling plate for light fixture bolts.
- H. Supports in Orthopedic Brace Shop:
1. Fabricate from 25 mm (one inch) steel pipe, fasten to steel angles above and extend to a point 150 mm (6 inches) below finished ceiling.
  2. Lower end of the pipe shall have a standard pipe thread.
  3. Provide an escutcheon plate at ceiling.
- I. Supports for Accordion Partition Tracks, Exercise Equipment, and Items at Various Conditions at Suspended Ceilings:
1. Fabricate of structural steel shapes as shown.
  2. Drill for anchor bolts of suspended item.
- J. Supports for Communion Rail Posts in Chapel:
1. Fabricate one steel plate support for each post as shown.
  2. Drill for fasteners.

**2.6 FRAMES**

- A. Elevator Entrance Wall Opening.
1. Fabricate of channel shapes, plates, and angles as shown.
  2. Weld or bolt head to jamb as shown.
  3. Weld clip angles to bottom of frame and top of jamb members extended to structure above for framed construction.
    - a. Provide holes for anchors.
    - b. Weld head to jamb members.
- B. Channel Door Frames:
1. Fabricate of structural steel channels of size shown.
  2. Miter and weld frames at corners.
  3. Where anchored to masonry or embedded in concrete, weld to back of frame at each jamb, 5 mm (3/16 inch) thick by 44 mm (1-3/4 inch) wide steel strap anchors with ends turned 50 mm (2 inches), and of sufficient length to extend at least 300 mm (12 inches) into wall. Space anchors 600 mm (24 inches) above bottom of frame and 600 mm

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(24 inches) o.c. to top of jamb. Weld clip angles to bottom of jambs and provide holes for expansion bolts.

4. Where anchored to concrete or masonry in prepared openings, drill holes at jambs for anchoring with expansion bolts. Weld clip angles to bottom of frame and provide holes for expansion bolt anchors as shown. Drill holes starting 600 mm (24 inches) above bottom of frame and 600 mm (24 inches) o.c. to top of jamb and at top of jamb. Provide pipe spacers at holes welded to channel.
5. Where closure plates are shown, continuously weld them to the channel flanges.
6. Weld continuous 19 x 19 x 3 mm (3/4 x 3/4 x 1/8 inch) thick steel angles to the interior side of each channel leg at the head and jambs to form a caulking groove.
7. Prepare frame for installation of hardware specified in Section 08 71 00, DOOR HARDWARE.
  - a. Cut a slot in the lock jamb to receive the lock bolt.
  - b. Where shown use continuous solid steel bar stops at perimeter of frame, weld or secure with countersunk machine screws at not more than 450 mm (18 inches) on center.

**C. Frames for Breech Opening:**

1. Fabricate from steel channels, or combination of steel plates and angles to size and contour shown.
2. Weld strap anchors on back of frame at not over 600 mm (2 feet) on centers for concrete or masonry openings.

**D. Frames for Lead Lined Doors:**

1. Obtain accurate dimensions and templates from suppliers of lead lined doors, finish hardware, and hollow steel door frames.
2. Fabricate as shown for use in connection with lead lined doors.
3. Deliver assembled frames with removable shipping spreaders at top and bottom.
4. Extend angles at jambs from floor to structural slab above. At floors of interstitial spaces, terminate jamb sections and provide anchors as shown.
5. Continuously weld plates and reinforcements to frame members and head members of angle frames between jambs.

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6. Weld strap anchors, not over 600 mm (24 inches) on centers, to the back of angles for embedment in masonry or concrete unless shown otherwise.
7. Type 15 Door Frames:
  - a. Structural steel angle frames with plate or bar full height to heads. Extend reinforcing at hinge cutouts two inches beyond cutout.
  - b. Fabricate top anchorage to beam side at mid height.
  - c. Weld clip angles to both legs of angle at top and bottom.
  - d. Drill clips and plates, at top and bottom for anchoring jamb angles with two 9 mm (3/8 inch) expansion bolts at each location.
  - e. Cut rabbet for pivot hinges and lock strike.

**2.7 GUARDS**

- A. Wall Corner Guards:
  1. Fabricate from steel angles and furnish with anchors as shown.
  2. Continuously weld anchor to angle.
- B. Guard Angles for Overhead Doors:
  1. Cut away top portion of outstanding leg of angle and extend remaining portion of angle up wall.
  2. Weld filler piece across head of opening to jamb angles.
  3. Make provisions for fasteners and anchorage.
- C. Channel Guard at Loading Platform:
  1. Fabricate from steel channel of size shown.
  2. Weld anchors to channels as shown.
  3. Drill channel for bumper anchor bolts.
- D. Edge Guard Angles for Openings in slabs.
  1. Fabricate from steel angles of sizes and with anchorage shown.
  2. Where size of angle is not shown, provide 50 x 50 x 6 mm (2 x 2 x 1/4 inch) steel angle with 32 x 5 mm (1-1/4 x 3/16 inch) strap anchors, welded to back.
  3. Miter or butt angles at corners and weld.
  4. Use one anchor near end and three feet on centers between end anchors.
- E. Wheel Guards:
  1. Construct wheel guards of not less than 16 mm (5/8 inch) thick cast iron.

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2. Provide corner type, with flanges for bolting to walls.

**2.8 COVERS AND FRAMES FOR PITS AND TRENCHES- (NOT USED)**

**2.9 GRATINGS**

- A. Fabricate gratings to support live loads specified and a concentrated load as specified.
- B. Provide clearance at all sides to permit easy removal of grating.
- C. Make cutouts in gratings with 6 mm (1/4 inch) minimum to 25 mm (one inch) maximum clearance for penetrations or passage of pipes and ducts. Edge band cutouts.
- D. Fabricate in sections not to exceed 2.3 m<sup>2</sup> (25 square feet) in area and 90 kg (200 pounds) in weight.
- E. Fabricate sections of grating with end-banding bars.
- F. Fabricate angle frames and supports, including anchorage as shown.
  - 1. Fabricate intermediate supporting members from "T's" or angles.
  - 2. Locate intermediate supports to support grating section edges.
  - 3. Fabricate frame to finish flush with top of grating.
  - 4. Locate anchors at ends and not over 600 mm (24 inches) o.c.
  - 5. Butt or miter, and weld angle frame at corners.
- G. Steel Bar Gratings:
  - 1. Fabricate grating using steel bars, frames, supports and other members shown in accordance with Metal Bar Grating Manual.
  - 2. Galvanize steel members after fabrication in accordance with ASTM A123, G-90 for exterior gratings, gratings in concrete floors, and interior grating where specified.
  - 3. Interior gratings: Prime paint unless specified galvanized.
- H. Aluminum Bar Gratings:
  - 1. Fabricate grating and frame assembly from aluminum as shown in accordance with Metal Bar Grating Manual.
  - 2. Use 25 x 5 mm (1 x 3/16 inch) minimum size bearing bars.
  - 3. Mill finish unless specified otherwise.
  - 4. Use serrated bars for exterior gratings and interior gratings
- I. Plank Gratings:
  - 1. Conform to Fed. Spec. RR-G-1602.
  - 2. Manufacturers standard widths, lengths and side channels to meet live load requirements.
  - 3. Galvanize exterior steel gratings ASTM A123, G-90 after fabrication.

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4. Fabricate interior steel gratings from galvanized steel sheet, ASTM A525, where bearing on concrete or masonry.
5. Fabricate other interior grating from steel sheet and finish with shop prime paint. Prime painted galvanized sheet may be used.

J. Cast Iron Gratings:

1. Fabricate gratings to support a live load of 23940 Pa (500 pounds per square foot).
2. Fabricate gratings and frames for gutter type drains from cast-iron conforming to ASTM A48.
3. Fabricate gratings in section not longer than 1200 mm (4 feet) or over 90 kg (200 pounds) and fit so as to be readily removable.

**2.10 LOOSE LINTELS**

- A. Furnish lintels of sizes shown. Where size of lintels is not shown, provide the sizes specified.
- B. Fabricate lintels with not less than 150 mm (6 inch) bearing at each end for nonbearing masonry walls, and 200 mm (8 inch) bearing at each end for bearing walls.
- C. Provide one angle lintel for each 100 mm (4 inches) of masonry thickness as follows except as otherwise specified or shown.
  1. Openings 750 mm to 1800 mm (2-1/2 feet to 6 feet) - 100 x 90 x 8 mm (4 x 3-1/2 x 5/16 inch).
  2. Openings 1800 mm to 3000 mm (6 feet to 10 feet) - 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).
- D. For 150 mm (6 inch) thick masonry openings 750 mm to 3000 mm (2-1/2 feet to 10 feet) use one angle 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).
- E. Provide bearing plates for lintels where shown.
- F. Weld or bolt upstanding legs of double angle lintels together with 19 mm (3/4 inch bolts) spaced at 300 mm (12 inches) on centers.
- G. Insert spreaders at bolt points to separate the angles for insertion of metal windows, louver, and other anchorage.
- H. Where shown or specified, punch upstanding legs of single lintels to suit size and spacing of anchor bolts.
- I. Elevator Entrance:
  1. Fabricate lintel from plate bent to channel shape, and provide a minimum of 100 mm (4 inch) bearing each end.

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2. Cut away the front leg of the channel at each end to allow for concealment behind elevator hoistway entrance frame.

**2.11 SHELF ANGLES**

- A. Fabricate from steel angles of size shown.
- B. Fabricate angles with horizontal slotted holes for 19 mm (3/4 inch) bolts spaced at not over 900 mm (3 feet) on centers and within 300 mm (12 inches) of ends.
- C. Provide adjustable malleable iron inserts for embedded in concrete framing.

**2.12 PLATE DOOR SILL**

- A. Fabricate of checkered plate as detailed.
  1. Aluminum Plate: ASTM B632, 3 mm (0.125 inch) thick.
  2. Steel Plate: ASTM A786, 3 mm (0.125 inch thick), galvanized G90.
- B. Fabricate for anchorage with flat head countersunk bolts at each end and not over 300 mm (12 inches), o.c.

**2.13 SAFETY NOSINGS**

- A. Fed. Spec. RR-T-650, Type C.
  1. Aluminum: Class 2, Style 2.
  2. Cast iron: Class 4.
- B. Fabricate nosings for exterior use from cast aluminum, and nosings for interior use from either cast aluminum or cast iron. Use one Class throughout.
- C. Fabricate nosings approximately 100 mm (4 inches) wide with not more than 9 mm (3/8 inch) nose.
- D. Provide nosings with integral type anchors spaced not more than 100 mm (4 inches) from each end and intermediate anchors spaced approximately 375 mm (15 inches) on center.
- E. Fabricate nosings to extend within 100 mm (4 inches) of ends of concrete stair treads except where shown to extend full width.
- F. Fabricate nosings to extend full width between stringers of metal stairs and full width of door openings.
- G. On curved steps fabricate to terminate at point of curvature of steps having short radius curved ends.

**2.14 LADDERS**

- A. Steel Ladders:

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1. Fixed-rail type with steel rungs shouldered and headed into and welded to rails.
2. Fabricate angle brackets of 50 mm (2 inch) wide by 13 mm (1/2 inch) thick steel; brackets spaced maximum of 1200 mm (4 feet) apart and of length to hold ladder 175 mm (7 inches) from wall to center of rungs. Provide turned ends or clips for anchoring.
3. Provide holes for anchoring with expansion bolts through turned ends and brackets.
4. Where shown, fabricate side rails curved, twisted and formed into a gooseneck.
5. Galvanize exterior ladders after fabrication, ASTM A123, G-90.

**B. Aluminum Ladders:**

1. Fixed-rail type, constructed of structural aluminum, with mill finish.
2. Fabricate side rails and rungs of size and design shown, with the rungs shouldered and headed into and welded to the rails.
3. Where shown fabrication side rails curved, twisted and formed into gooseneck.
4. Fabricate angle brackets at top and bottom and intermediate brackets where shown. Drill for bolting.

**C. Ladder Rungs:**

1. Fabricate from 25 mm (one inch) diameter steel bars.
2. Fabricate so that rungs will extend at least 100 mm (4 inches) into wall with ends turned 50 mm (2 inches), project out from wall 175 mm (7 inches), be 400 mm (16 inches) wide and be designed so that foot cannot slide off end.
3. Galvanized after fabrication, ASTM A123, G-90 rungs for exterior use and for access to pits.

**2.15 RAILINGS**

- A. In addition to the dead load design railing assembly to support live load specified.

**B. Fabrication General:**

1. Provide continuous welded joints, dressed smooth and flush.
2. Standard flush fittings, designed to be welded, may be used.
3. Exposed threads will not be approved.

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4. Form handrail brackets to size and design shown.
5. Exterior Post Anchors.
  - a. Fabricate tube or pipe sleeves with closed ends or plates as shown.
  - b. Where inserts interfere with reinforcing bars, provide flanged fittings welded or threaded to posts for securing to concrete with expansion bolts.
  - c. Provide heavy pattern sliding flange base plate with set screws at base of pipe or tube posts.
6. Interior Post Anchors:
  - a. Provide flanged fittings for securing fixed posts to floor with expansion bolts, unless shown otherwise.
  - b. Weld or thread flanged fitting to posts at base.
  - c. For securing removable posts to floor, provide close fitting sleeve insert or inverted flange base plate with stud bolts or rivets concrete anchor welded to the base plate.
  - d. Provide sliding flange base plate on posts secured with set screws.
  - e. Weld flange base plate to removable posts set in sleeves.

C. Handrails:

1. Close free ends of rail with flush metal caps welded in place except where flanges for securing to walls with bolts are shown.
2. Make provisions for attaching handrail brackets to wall, posts, and handrail as shown.

D. Steel Pipe Railings:

1. Fabricate of steel pipe with welded joints.
2. Number and space of rails as shown.
3. Space posts for railings not over 1800 mm (6 feet) on centers between end posts.
4. Form handrail brackets from malleable iron.
5. Fabricate removable sections with posts at end of section.
6. Removable Rails:
  - a. Provide "U" shape brackets at each end to hold removable rail as shown. Use for top and bottom horizontal rail when rails are joined together with vertical members.



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- b. Secure rail to brackets with 9 mm (3/8 inch) stainless steel through bolts and nuts at top rail only when rails joined with vertical members.
  - c. Continuously weld brackets to post.
  - d. Provide slotted bolt holes in rail bracket.
  - e. Weld bolt heads flush with top of rail.
  - f. Weld flanged fitting to post where posts are installed in sleeves.
7. Opening Guard Rails:
- a. Fabricate rails with flanged fitting at each end to fit between wall opening jambs.
  - b. Design flange fittings for fastening with machine screws to steel plate anchored to jambs.
  - c. Fabricate rails for floor openings for anchorage in sleeves.
- E. Aluminum Railings:
- 1. Fabricate from extruded aluminum.
  - 2. Use tubular posts not less than 3 mm (0.125 inch) wall thickness for exterior railings.
  - 3. Punch intermediate rails and bottom of top rails for passage of posts and machine to a close fit.
  - 4. Where shown use extruded channel sections for top rail with 13 mm (1/2 inch) thick top cover plates and closed ends.
  - 5. Fabricate brackets of extruded or wrought aluminum as shown.
  - 6. Fabricate stainless pipe sleeves with closed bottom at least six inches deep having internal dimensions at least 13 mm (1/2 inch) greater than external dimensions of posts where set in concrete.
- F. Stainless Steel Railings:
- 1. Fabricate from 38 mm (1-1/2 inches) outside diameter stainless steel tubing, ASTM A269, having a wall thickness of 1.6 mm (0.065 inch).
  - 2. Join sections by an internal connector to form hairline joints where field assembled.
  - 3. Fabricate with continuous welded connections.
  - 4. Fabricate brackets of stainless steel to design shown.
  - 5. Fabricate stainless steel sleeves at least 150 mm (6 inches) deep having internal dimensions at least 13 mm (1/2 inch) greater than external dimensions of post.

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**2.16 CATWALKS- NOT USED**

**2.17 TRAP DOOR AND FRAMES WITH CEILING HATCH**

- A. Design to support a live load as specified.
- B. Frames:
  - 1. Fabricate steel angle frame to set in concrete slabs and design to set flush with finished concrete slab or curb. If not shown use 63 x 63 x 6 mm (2-1/2 x 2-1/2 x 1/4 inch) angles.
  - 2. Miter steel angles at corners and weld together.
  - 3. Weld steel bar stops to vertical leg of frame, to support doors flush with the top of the frame.
  - 4. Weld steel strap anchors on each side not over 600 mm (24 inches) on center to the backs of the frames. If not shown use 6 x 50 x 200 mm (1/4 x 2 x 8 inch) long straps with 50 mm (2 inch bent) ends.
  - 5. Form frames from steel angles with welded corners for reinforcing and bracing of well lining and support of ceiling hatch.
- C. Covers:
  - 1. Use 6 mm (1/4 inch) thick steel floor plate.
  - 2. Where double leaf covers are shown, reinforce at meeting edges.
  - 3. Use wrought steel hinges with fixed brass pins.
    - a. Weld to cover.
    - b. Secure to frame with machine screws.
  - 4. Where ladders occur, install hinges on the side opposite the ladder.
  - 5. Provide two bar type drop handles, flush with cover when closed for each leaf.
- D. Well Lining:
  - 1. Fabricate well linings, for access through concrete floor slabs and suspended ceilings, from hatch to ceiling hatch or ceiling openings.
  - 2. Use steel sheet and shapes of size and thickness as shown. If not shown use 1.5 mm (0.0598 inch) thick steel sheet.
  - 3. If not shown use 50 x 50 x 6 mm (2 x 2 x 1/4 inch) angle braces from ceiling level on each side angled at 45 degrees to structure above.
  - 4. Use 25 x 25 x 3 mm (1 x 1 x 1/8 inch) angle bottom flange trim welded to well lining where no ceiling hatch occurs.
- E. Ceiling Hatch:

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1. Construct hatch with "T" or angle frame designed to support edge of ceiling and hatch, weld to well lining.
  2. Form hatch panels of 3 mm (1/8 inch) steel, 5 mm (3/16 inch) aluminum or 1 mm (0.0359 inch) thick steel of pan type construction with 25 mm (one inch) of mineral fiber insulation between.
  3. Use counter balance device, hinges, latch, hangers and other accessories required for installation and operation of hatch with not over 90 N (20 pounds) of force.
  4. Fabricate panels flush and reinforced to remain flat.
  5. Locate hatch panel flush with frame.
- F. Finish with baked on prime coat.

**2.18 SIDEWALK DOOR- (NOT USED)**

**2.19 SCREENED ACCESS DOORS AND FRAMES**

- A. Galvanized ASTM A123, G-90 after fabrication.
- B. Wall frame:
1. Fabricate frame from steel angles or channels as shown.
  2. Continuously weld 38 x 13 mm (1-1/2 x 1/2 inch) steel channel door stop to angle frame. Cut out lock strike opening in channel.
  3. Miter and weld channel frame at corners. Reinforce corner with 3 mm (1/8 inch) plate angle.
  4. Reinforce channel frame with 3 x 150 mm (1/8 x 6 inch) long steel plate at channel back to cutout for latch. Cutout lock strike opening in channel face. Drill and tap for hinge anchorage.
  5. Drill jambs for 6 mm (1/4 inch) bolt anchors at top and bottom and not over 450 mm (18 inches) between top and bottom.
  6. Fabricate frame for door to sit flush with face of frame.
- C. Doors
1. Fabricate door using steel channel frame with 3 mm (1/8 inch) angle plate reinforcing at corners.
  2. Miter and weld corners.
  3. Fabricate lock box of 1.6 mm (1/16 inch) plate and weld to channel surround.
  4. Provide wire mesh constructed of 3.5 mm (0.135 inch) diameter galvanized steel wire crimped and woven into 38 mm (1-1/2 inch) diamond mesh pattern. Fasten the wire mesh to door frames by bending

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the ends of each strand of wire over through channel clinched and welded to channel door frame.

5. Weld steel plate back-bands to channel door frame at hinge stiles only.

6. Screen on doors in exterior walls.

a. Fabricate rewirable frame for screen from either extruded or tubular aluminum.

b. Design to allow for removing or replacement frame and screening or adjoining items without damage.

c. Use aluminum insect screening specified.

d. Use stainless steel fasteners for securing screen to door.

**D. Hardware:**

1. Install hinged door to fixed frame with two 63 mm (2-1/2 inch) brass or bronze hinges.

2. Install lock or latch specified in Section 08 71 00, DOOR HARDWARE in lockbox.

**2.20 STEEL COUNTER OR BENCH TOP FRAME AND LEGS**

A. Fabricate channel or angle frame with mitered and welded corners as shown.

B. Drill top of frame with 6 mm (1/4inch) holes spaced 200 mm (8 inches) on center for securing countertop.

C. Fabricate legs of angle or pipe shapes and continuously weld to frame.

D. Finish frame with backed on enamel prime coat.

**PART 3 - EXECUTION**

**3.1 INSTALLATION, GENERAL**

A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Items set into concrete or masonry.

1. Provide temporary bracing for such items until concrete or masonry is set.

2. Place in accordance with setting drawings and instructions.

3. Build strap anchors, into masonry as work progresses.

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- C. Set frames of gratings, covers, corner guards, trap doors and similar items flush with finish floor or wall surface and, where applicable, flush with side of opening.
- D. Field weld in accordance with AWS.
  - 1. Design and finish as specified for shop welding.
  - 2. Use continuous weld unless specified otherwise.
- E. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.
- F. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.
- G. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.
- H. Secure escutcheon plate with set screw.

**3.2 INSTALLATION OF SUPPORTS**

- A. Anchorage to structure.
  - 1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.
  - 2. Secure supports to concrete inserts by bolting or continuous welding as shown.
  - 3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts. unless shown otherwise.
  - 4. Secure steel plate or hat channels to studs as detailed.
- B. Ceiling Hung Toilet Stalls:
  - 1. Securely anchor hangers of continuous steel channel above pilasters to structure above.
  - 2. Bolt continuous steel angle at wall to masonry or weld to face of each metal stud.
  - 3. Secure brace for steel channels over toilet stall pilasters to wall angle supports with bolts at each end spaced as shown.
  - 4. Install diagonal angle brace where the suspended ceiling over toilet stalls does not extend to side wall of room.

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5. Install stud bolts in lower flange of channel before installing furred down ceiling over toilet stalls.
6. Install support for ceiling hung pilasters at entrance screen to toilet room similar to toilet stall pilasters.

C. Supports for Wall Mounted items:

1. Locate center of support at anchorage point of supported item.
2. Locate support at top and bottom of wall hung cabinets.
3. Locate support at top of floor cabinets and shelving installed against walls.
4. Locate supports where required for items shown.

D. Ceiling Support for Operating Light:

1. Anchor support to structure above as shown.
2. Set leveling plate as shown level with ceiling.
3. Secure operating light to leveling plate in accordance with light manufacturer's requirements.

F. Supports for intravenous (IV) Track and Cubicle Curtain Track:

1. Install assembly where shown after ceiling suspension grid is installed.
2. Drill angle for bolt and weld nut to angle prior to installation of tile.

G. Support for cantilever grab bars:

1. Locate channels or tube in partition for support as shown, and extend full height from floor to underside of structural slab above.
2. Anchor at top and bottom with angle clips bolted to channels or tube with two, 9 mm (3/8 inch) diameter bolts.
3. Anchor to floors and overhead construction with two 9 mm (3/8 inch) diameter bolts.
4. Fasten clips to concrete with expansion bolts, and to steel with machine bolts or welds.

H. Support for Communion Rail Posts:

1. Anchor steel plate supports for posts as shown.
2. Use four bolts per plate, locate two at top and two at bottom.
3. Use lag bolts.

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**3.3 COVERS AND FRAMES FOR PITS AND TRENCHES- (NOT USED)**

**3.4 FRAMES FOR LEAD LINED DOORS- (NOT USED)**

**3.5 DOOR FRAMES**

- A. Secure clip angles at bottom of frames to concrete slab with expansion bolts as shown.
- B. Level and plumb frame; brace in position required.
- C. At masonry, set frames in walls so anchors are built-in as the work progresses unless shown otherwise.
- D. Set frames in formwork for frames cast into concrete.
- E. Where frames are set in prepared openings, bolt to wall with spacers and expansion bolts.

**3.6 OTHER FRAMES**

- A. Set frame flush with surface unless shown otherwise.
- B. Anchor frames at ends and not over 450 mm (18 inches) on centers unless shown otherwise.
- C. Set in formwork before concrete is placed.

**3.7 GUARDS**

- A. Steel Angle Corner Guards:
  - 1. Build into masonry as the work progress.
  - 2. Set into formwork before concrete is placed.
  - 3. Set angles flush with edge of opening and finish floor or wall or as shown.
  - 4. At existing construction fasten angle and filler piece to adjoining construction with 16 mm (5/8 inch) diameter by 75 mm (3 inch) long expansion bolts 450 mm (18 inches) on center.
  - 5. Install Guard Angles at Edges of Trench and Stairwell Openings in Slab, and Overhead Doors where shown.
- B. Channel Guard at Top Edge of Concrete Platforms:
  - 1. Install in formwork before concrete is placed.
  - 2. Set channel flush with top of the platform.
- C. Wheel Guards:
  - 1. Set flanges of wheel guard at least 50 mm (2 inches) into pavement.
  - 2. Anchor to walls as shown, expansion bolt if not shown.

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**3.8 GRATINGS**

- A. Set grating flush with finish floor; top of curb, or areaway wall. Set frame so that horizontal leg of angle frame is flush with face of wall except when frame is installed on face of wall.
- B. Set frame in formwork before concrete is placed.
- C. Where grating terminates at a wall bolt frame to concrete or masonry with expansion bolts unless shown otherwise.
- D. Secure removable supporting members in place with stainless steel bolts.
- E. Bolt gratings to supports.

**3.9 STEEL LINTELS**

- A. Use lintel sizes and combinations shown or specified.
- B. Install lintels with longest leg upstanding, except for openings in 150 mm (6 inch) masonry walls install lintels with longest leg horizontal.
- C. Install lintels to have not less than 150 mm (6 inch) bearing at each end for nonbearing walls, and 200 mm (8 inch) bearing at each end for bearing walls.

**3.10 SHELF ANGLES**

- A. Anchor shelf angles with 19 mm (3/4 inch) bolts unless shown otherwise in adjustable malleable iron inserts, set level at elevation shown.
- B. Provide expansion space at end of members.

**3.11 PLATE DOOR SILL**

- A. Install after roofing base flashing and counter flashing work is completed.
- B. Set in sealant and bolt to curb.

**3.12 SAFETY NOSINGS**

- A. Except as specified and where preformed rubber treads are shown or specified install safety nosings at the following:
  - 1. Exterior concrete steps.
  - 2. Door sills of areaway entrances curbs.
  - 3. Exposed edges of curbs of door sills at transformer and service rooms.
  - 4. Interior concrete steps, including concrete filled treads of metal stairs of service stairs.
- B. Install flush with horizontal and vertical surfaces.



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- C. Install nosing to within 100 mm (4 inches) of ends of concrete stair treads, except where shown to extend full width.
- D. Extend nosings full width of door openings.
- E. Extend nosings, full width between stringers of metal stairs, and terminate at point of curvature of steps having short radius curved ends.

**3.13 LADDERS**

- A. Anchor ladders to walls and floors with expansion bolts through turned lugs or angle clips or brackets.
- B. In elevator pits, set ladders to clear all elevator equipment where shown on the drawings.
  - 1. Where ladders are interrupted by division beams, anchor ladders to beams by welding, and to floors with expansion bolts.
  - 2. Where ladders are adjacent to division beams, anchor ladders to beams with bent steel plates, and to floor with expansion bolts.
- C. Ladder Rungs:
  - 1. Set ladder rungs into formwork before concrete is placed
  - 2. Set step portion of rung 150 mm (6 inches) from wall.
  - 3. Space rungs approximately 300 mm (12 inches) on centers.
  - 4. Where only one rung is required, locate it 400 mm (16 inches) above the floor.

**3.14 RAILINGS**

- A. Steel Posts:
  - 1. Secure fixed posts to concrete with expansion bolts through flanged fittings except where sleeves are shown with pourable grout.
  - 2. Install sleeves in concrete formwork.
  - 3. Set post in sleeve and pour grout to surface. Apply beveled bead of urethane sealant at perimeter of post or under flange fitting as specified in Section 07 92 00, JOINT SEALANTS—on exterior posts.
  - 4. Secure removable posts to concrete with either machine screws through flanged fittings which are secured to inverted flanges embedded in and set flush with finished floor, or set posts in close fitting pipe sleeves without grout.
  - 5. Secure sliding flanged fittings to posts at base with set screws.
  - 6. Secure fixed flanged fittings to concrete with expansion bolts.
  - 7. Secure posts to steel with welds.

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B. Aluminum Railing, Stainless Steel Railing, and Ornamental Railing

Posts:

1. Install pipe sleeves in concrete formwork.
2. Set posts in sleeve and pour grout to surface on exterior locations and to within 6 mm (1/4 inch) of surface for interior locations except to where posts are required to be removable.
3. Apply beveled bead of urethane sealant over sleeve at post perimeter for exterior posts and flush with surface for interior posts as specified in Section 07 92 00, JOINT SEALANTS.

C. Anchor to Walls:

1. Anchor rails to concrete or solid masonry with machine screws through flanged fitting to steel plate.
  - a. Anchor steel plate to concrete or solid masonry with expansion bolts.
  - b. Anchor steel plate to hollow masonry with toggle bolts.
2. Anchor flanged fitting with toggle bolt to steel support in frame walls.

D. Removable Rails:

1. Rest rails in brackets at each end and secure to bracket with stainless steel bolts and nuts where part of a continuous railing.
2. Rest rail posts in sleeves where not part of a continuous railing.  
Do not grout posts.

E. Gates:

1. Hang gate to swing as shown.
2. Bolt gate hinges to jamb post with clamp on or through bolts.

F. Chains:

1. Eye bolt chains to pipe posts.
2. Eye bolt anchoring at walls.
  - a. Expansion bolt to concrete or solid masonry.
  - b. Toggle bolt to hollow masonry of frame wall installed support.

G. Handrails:

1. Anchor brackets for metal handrails as detailed.
2. Install brackets within 300 mm (12 inches) of return of walls, and at evenly spaced intermediate points not exceeding 1200 mm (4 feet) on centers unless shown otherwise.

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3. Expansion bolt to concrete or solid masonry.
4. Toggle bolt to installed supporting frame wall and to hollow masonry unless shown otherwise.

**3.15 CATWALK AND PLATFORMS- (NOT USED)**

**3.16 SIDEWALK DOOR, TRAP DOORS, AND FRAMES- (NOT USED)**

**3.17 SCREENED ACCESS DOOR**

- A. Set frame in opening so that clearance at jambs is equal and secure with expansion bolts.
- B. Use shims at bolts to prevent deformation of frame members in prepared openings.
- C. Set frame in mortar bed and build in anchors as the masonry work progresses.
- D. Grout jambs solid with mortar.
- E. Secure insect screen to inside of door with stainless steel fasteners on doors in exterior walls.

**3.18 STEEL COMPONENTS FOR MILLWORK ITEMS**

- A. Coordinate and deliver to Millwork fabricator for assembly where millwork items are secured to metal fabrications.

**3.19 CLEAN AND ADJUSTING**

- A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.
- B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

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**SECTION 05 51 00**

**METAL STAIRS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Section specifies steel stairs with railings.
- B. Types:
  - 1. Closed riser stairs with concrete filled treads and platforms.

**1.2 RELATED WORK**

- A. Concrete fill for treads and platforms: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Wall handrails and railings for other than steel stairs: Section 05 50 00, METAL FABRICATIONS.
- C. Requirements for shop painting: Section 09 91 00, PAINTING.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Show design, fabrication details, installation, connections, material, and size of members.
- C. Signed and sealed by Arizona Professional Engineer design calculations for metal stairs, handrail and guardrails.

**1.4 APPLICATION PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation.
- B. American Society for Testing and Materials (ASTM):
  - A36/A36M-08.....Structural Steel
  - A47-99 (R2009).....Ferritic Malleable Iron Castings
  - A48-03(R2008).....Gray Iron Castings
  - A53-10.....Pipe, Steel, Black and Hot-Dipped Zinc-Coated  
Welded and Seamless
  - A307-10.....Carbon Steel Bolts and Studs, 60000 psi Tensile  
Strength
  - A653/653M-10.....Steel Sheet, Zinc Coated (Galvanized) or Zinc  
Alloy Coated (Galvannealed) by the Hot-Dip  
Process
  - A563-07.....Carbon and Alloy Steel Nuts
  - A1008-10.....Steel, Sheet, Cold-Rolled, Carbon, Structural,  
High-Strength, Low-Alloy

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A786/A786M-09.....Rolled Steel Floor Plates

A1011-10.....Steel, Sheet and Strip, Strip, Hot-Rolled  
Carbon, Structural, High-Strength, Low-Alloy

C. American Welding Society (AWS):

D1.1-10.....Structural Welding Code-Steel

D1.3-08.....Structural Welding Code-Sheet Steel

D. The National Association of Architectural Metal Manufacturers (NAAMM)  
Manuals:

Metal Bar Gratings (ANSI/NAAMM MBG 531-09)

AMP521-01.....Pipe Railing Manual, Including Round Tube

E. American Iron and Steel Institute (AISI):

2001.....Design of Cold-Formed Steel Structural Members

**PART 2 - PRODUCTS**

**2.1 DESIGN CRITERIA**

- A. Design stairs to support a live load of 500 kg/m<sup>2</sup> (100 pounds per square foot).
- B. Structural design, fabrication and assembly in accordance with requirements of NAAMM Metal Stairs Manual, except as otherwise specified or shown.
- C. Design Grating treads in accordance with NAAMM Metal Bar Grating Manual.
- D. Design pipe railings in accordance with NAAMM Pipe Railing Manual for 900 N (200 pounds) in any direction at any point.

**2.2 MATERIALS**

- A. Steel Pipe: ASTM A53, Standard Weight, zinc coated.
- B. Steel Grating: Metal bar type grating NAAMM BG.
- C. Sheet Steel: ASTM A1008.
- D. Structural Steel: ASTM A36.
- E. Steel Floor Plate: ASTM 786.
- F. Steel Decking: Form from zinc coated steel conforming to ASTM A446, with properties conforming to AISI Specification for the Design of Cold-Formed Steel Structural Members.
- G. Steel Plate: ASTM A1011.
- H. Iron Castings: ASTM A48, Class 30.
- I. Malleable Iron Castings: ASTM A47.

**2.3 FABRICATION GENERAL**

A. Fasteners:

- 1. Conceal bolts and screws wherever possible.

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2. Use countersunk heads on exposed bolts and screws with ends of bolts and screws dressed flush after nuts are set.

**B. Welding:**

1. Structural steel, AWS D1.1 and sheet steel, AWS D1.3.
2. Where possible, locate welds on unexposed side.
3. Grind exposed welds smooth and true to contour of welded member.
4. Remove welding splatter.

**C. Remove sharp edges and burrs.**

- D. Fit stringers to head channel and close ends with steel plates welded in place where shown.**

- E. Fit face stringer to newel post by tenoning into newel post, or by notching and fitting face stringer to side of newel where shown.**

- F. Shop Prime Painting: Prepare surface and apply primer as specified for ferrous metals in Section 09 91 00, PAINTING.**

**2.4 RAILINGS**

- A. Fabricate railings, including handrails, from steel pipe with flush.**

1. Connections may be standard fittings designed for welding, or coped or mitered pipe with full welds.

2. Wall handrails are provided under Section 05 50 00, METAL FABRICATIONS.

- B. Return ends of handrail to wall and close free end.**

- C. Provide standard terminal castings where fastened to newel.**

- D. Space intermediate posts not over four feet on center between end post or newel post.**

- E. Fabricate handrail brackets from cast malleable iron.**

- F. Provide standard terminal fittings at ends of post and rails.**

**2.5 CLOSED RISER STAIRS**

- A. Provide treads, risers, platforms, railings, stringers, headers and other supporting members.**

- B. Fabricate pans for treads and platforms, and risers from sheet steel. Fabricate pans for platforms from steel decking where shown.**

- C. Form risers with sanitary cove.**

- D. Fabricate stringers, headers, and other supporting members from structural steel.**

- E. Construct newel posts of steel tubing having wall thickness not less than 5 mm (3/16-inch), with forged steel caps and drops.**

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**2.6 INDUSTRIAL STAIRS - NOT USED**

**PART 3 - EXECUTION**

**3.1 STAIR INSTALLATION**

- A. Provide hangers and struts required to support the loads imposed.
- B. Perform job site welding and bolting as specified for shop fabrication.
- C. Set stairs and other members in position and secure to structure as shown.
- D. Install stairs plumb, level and true to line.
- E. Provide steel closure plate to fill any gap between the stringer and surrounding shaft wall. Weld and finish with prime and paint finish of adjoining steel.

**3.2 RAILING INSTALLATION**

- A. Install standard terminal fittings at ends of posts and rails.
- B. Secure brackets, posts and rails to steel by welds, and to masonry or concrete with expansion sleeves and bolts, except secure posts at concrete by setting in sleeves filled with commercial non-shrink grout.
- C. Set rails horizontal or parallel to rake of stairs to within 3 mm in 3650 mm (1/8-inch in 12 feet).
- D. Set posts plumb and aligned to within 3 mm in 3650 mm (1/8-inch in 12 feet).

**3.3 FIELD PRIME PAINTING**

- A. When installation is complete, clean field welds and surrounding areas to bright metal, and coat with same primer paint used for shop priming.
- B. Touch-up abraded areas with same primer paint used for shop priming.
- C. Touch up abraded galvanized areas with zinc rich paint as specified in section 09 91 00, PAINTING.

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**DIVISION 06**

**WOOD AND PLASTIC**



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**SECTION 06 10 00**

**ROUGH CARPENTRY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Section specifies wood blocking, framing, sheathing, furring, nailers, sub-flooring, rough hardware, and light wood construction.

**1.2 RELATED WORK (NOT USED)**

**1.3 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings showing framing connection details, fasteners, connections and dimensions.

**1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:**

- A. Protect lumber and other products from dampness both during and after delivery at site.
- B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.
- C. Stack plywood and other board products so as to prevent warping.
- D. Locate stacks on well drained areas, supported at least 6 inches above grade and cover with well ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

**1.5 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.
- B. American Forest and Paper Association (AFPA):  
National Design Specification for Wood Construction  
NDS-05.....Conventional Wood Frame Construction
- C. American Institute of Timber Construction (AITC):  
A190.1-07.....Structural Glued Laminated Timber
- D. American Society of Mechanical Engineers (ASME):  
B18.2.1-96(R2005).....Square and Hex Bolts and Screws  
B18.2.2-87.....Square and Hex Nuts  
B18.6.1-97.....Wood Screws  
B18.6.4-98(R2005).....Thread Forming and Thread Cutting Tapping Screws  
and Metallic Drive Screws
- E. American Plywood Association (APA):

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- E30-07.....Engineered Wood Construction Guide
- F. American Society for Testing And Materials (ASTM):
- A47-99(R2009).....Ferritic Malleable Iron Castings
- A48-03(R2008).....Gray Iron Castings
- A653/A653M-10.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
- C954-10.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch (2.24 mm) to 0.112-inch (2.84 mm) in thickness
- C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs
- D143-09.....Small Clear Specimens of Timber, Method of Testing
- D1760-01.....Pressure Treatment of Timber Products
- D2559-10.....Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions
- D3498-11.....Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
- F844-07.....Washers, Steel, Plain (Flat) Unhardened for General Use
- F1667-08.....Nails, Spikes, and Staples
- G. Federal Specifications (Fed. Spec.):
- MM-L-736C.....Lumber; Hardwood
- H. Commercial Item Description (CID):
- A-A-55615.....Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)
- I. Military Specification (Mil. Spec.):
- MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated
- J. Truss Plate Institute (TPI):
- TPI-85.....Metal Plate Connected Wood Trusses
- K. U.S. Department of Commerce Product Standard (PS)
- PS 1-95.....Construction and Industrial Plywood
- PS 20-05.....American Softwood Lumber Standard

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**PART 2 - PRODUCTS**

**2.1 LUMBER:**

- A. Unless otherwise specified, each piece of lumber bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.
  - 1. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
  - 2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.
- B. Lumber Other Than Structural:
  - 1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
  - 2. Framing lumber: Minimum extreme fiber stress in bending of 1100.
  - 3. Furring, blocking, nailers and similar items 100 mm (4 inches) and narrower Standard Grade; and, members 150 mm (6 inches) and wider, Number 2 Grade.
- C. Sizes:
  - 1. Conforming to Prod. Std., PS20.
  - 2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.
- D. Moisture Content:
  - 1. At time of delivery and maintained at the site.
  - 2. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
  - 3. Lumber over 2 inches thick: 25 percent or less.
- E. Fire Retardant Treatment:
  - 1. Mil Spec. MIL-L-19140 with piece of treated material bearing identification of testing agency and showing performance rating.
  - 2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.
- F. Preservative Treatment:
  - 1. Do not treat Heart Redwood and Western Red Cedar.
  - 2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less

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than 24 inches from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members used in connection with roofing and flashing materials.

3. Treat other members specified as preservative treated (PT).
4. Preservative treat by the pressure method complying with ASTM D1760, except any process involving the use of Chromated Copper arsenate (CCA) for pressure treating wood is not permitted.

**2.2 PLYWOOD**

- A. Comply with Prod. Std., PS 1.
- B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.
- C. Sheathing:
  1. APA rated Exposure 1 or Exterior; panel grade CD or better.
  2. Wall sheathing:
    - a. Minimum 11/32 inch thick with supports 16 inches on center and 15/32 inch thick with supports 600 mm (24 inches) on center unless specified otherwise.
    - b. Minimum 48 inches wide at corners without corner bracing of framing.

**2.4 ROUGH HARDWARE AND ADHESIVES:**

- A. Anchor Bolts:
  1. ASME B18.2.1 and ANSI B18.2.2 galvanized, 1/2 inch unless shown otherwise.
  2. Extend at least 8 inches) into masonry or concrete with ends bent 50 mm (2 inches).
- B. Miscellaneous Bolts: Expansion Bolts: C1D, A-A-55615; lag bolt, long enough to extend at least 2-1/2 inches into masonry or concrete. Use 1/2 inch bolt unless shown otherwise.
- C. Washers
  1. ASTM F844.
  2. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.
- D. Screws:
  1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.
  2. Wood to Steel: ASTM C954, or ASTM C1002.
- E. Nails:

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1. Size and type best suited for purpose unless noted otherwise. Use aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.
2. ASTM F1667:
  - a. Common: Type I, Style 10.
  - b. Concrete: Type I, Style 11.
  - c. Barbed: Type I, Style 26.
  - d. Underlayment: Type I, Style 25.
  - e. Masonry: Type I, Style 27.
  - f. Use special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 32 mm (1-1/4 inches) long, 8d and deformed or annular ring shank.

**PART 3 - EXECUTION**

**3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:**

- A. Conform to applicable requirements of the following:
  1. AFPA National Design Specification for Wood Construction for timber connectors.
  2. AITC Timber Construction Manual for heavy timber construction.
  3. AFPA WCD-number 1, Manual for House Framing for nailing and framing unless specified otherwise.
  4. APA for installation of plywood or structural use panels.
  5. ASTM F 499 for wood underlayment.
  6. TPI for metal plate connected wood trusses.
- B. Fasteners:
  1. Nails.
    - a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA Manual for House Framing where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
    - b. Use special nails with framing connectors.
- C. Cut notch, or bore in accordance with NFPA Manual for House-Framing for passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.

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**DIVISION 07**

**THERMAL AND MOISTURE**

**PROTECTION**



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**SECTION 07 11 13**  
**BITUMINOUS DAMPPROOFING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies materials and workmanship for bituminous dampproofing on concrete and masonry surfaces.

**1.2 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
1. Product description.
  2. Application instructions.

**1.3 APPLICABLE PUBLICATIONS:**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
- D226-09.....Asphalt-Saturated Organic Felt Used in Roofing  
and Waterproofing
- D449-03(R2008).....Asphalt Used in Dampproofing and Waterproofing
- D1227-95(R2007).....Emulsified Asphalt Used as a Protective Coating  
for Roofing

**PART 2 - PRODUCTS**

**2.1 ASPHALT (HOT APPLIED):**

- A. ASTM D449, Type I.

**2.2 ASPHALT SATURATED FELT:**

- A. ASTM D226, Type I, 7 kg (15 pound).

**PART 3 - EXECUTION**

**3.1 SURFACE PREPARATION:**

- A. Surfaces to receive dampproofing shall be clean and smooth.
- B. Remove foreign matter, loose particles of mortar or other cementitious droppings.
- C. Clean and wash soil or dirt particles from surface.
- D. Remove free water; surfaces may remain damp.

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**3.2 APPLICATION:**

- A. Comply with Manufacturer written instructions for methods and rates of dampproofing application, cleaning and installation of any protection course.
- B. Apply each coat at the rate of not less than 1 L/m<sup>2</sup> (2-1/2 gallons per 100 square feet) and allow not less than 24 hours drying time after application.

**3.3 LOCATION:**

- A. Apply to surfaces where shown.

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**SECTION 07 92 00**  
**JOINT SEALANTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

**1.2 RELATED WORK (NOT USED)**

**1.3 QUALITY CONTROL:**

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.
  - 1. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- D. VOC: Acrylic latex and Silicon sealants shall have less than 50g/l VOC content.

**1.4 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's installation instructions for each product used.
- C. Cured samples of exposed sealants for each color where required to match adjacent material.
- D. Manufacturer's Literature and Data:
  - 1. Caulking compound
  - 2. Primers
  - 3. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

**1.5 PROJECT CONDITIONS:**

- A. Environmental Limitations:

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1. Do not proceed with installation of joint sealants under following conditions:

- a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 °F.
- b. When joint substrates are wet.

**B. Joint-Width Conditions:**

1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

**C. Joint-Substrate Conditions:**

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

**1.6 DELIVERY, HANDLING, AND STORAGE:**

- A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.
- B. Carefully handle and store to prevent inclusion of foreign materials.
- C. Do not subject to sustained temperatures exceeding 90° F or less than 40° F.

**1.7 DEFINITIONS:**

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Back-up Rod: A type of sealant backing.
- C. Bond Breakers: A type of sealant backing.
- D. Filler: A sealant backing used behind a back-up rod.

**1.8 WARRANTY:**

- A. Warranty exterior sealing against leaks, adhesion, and cohesive failure, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to two years.
- B. General Warranty: Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

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**1.9 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
- C509-06.....Elastomeric Cellular Preformed Gasket and Sealing Material.
  - C612-10.....Mineral Fiber Block and Board Thermal Insulation.
  - C717-10.....Standard Terminology of Building Seals and Sealants.
  - C834-10.....Latex Sealants.
  - C919-08.....Use of Sealants in Acoustical Applications.
  - C920-10.....Elastomeric Joint Sealants.
  - C1021-08.....Laboratories Engaged in Testing of Building Sealants.
  - C1193-09.....Standard Guide for Use of Joint Sealants.
  - C1330-02 (R2007).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
  - D1056-07.....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
  - E84-09.....Surface Burning Characteristics of Building Materials.
- C. Sealant, Waterproofing and Restoration Institute (SWRI).  
The Professionals' Guide

**PART 2 - PRODUCTS**

**2.1 SEALANTS:**

- A. S-1:
- 1. ASTM C920, polyurethane or polysulfide.
  - 2. Type M.
  - 3. Class 25.
  - 4. Grade NS.
  - 5. Shore A hardness of 20-40
- B. S-2:
- 1. ASTM C920, silicone, neutral cure.

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2. Type S.
3. Class: Joint movement range of plus 100 percent to minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-20.
6. Minimum elongation of 1200 percent.

C. S-3:

1. ASTM C920 silicone.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Non-yellowing, mildew resistant.

**2.2 CAULKING COMPOUND:**

- A. C-1: ASTM C834, acrylic latex.
- B. C-2: One component acoustical caulking, non drying, non hardening, synthetic rubber.

**2.3 COLOR:**

- A. A. Sealants used with unpainted concrete shall match color of adjacent concrete.
- B. Color of sealants for other locations shall be light gray or aluminum, unless specified otherwise.
- C. Caulking shall be light gray or white, unless specified otherwise.

**2.4 JOINT SEALANT BACKING:**

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
  1. Type C: Closed-cell material with a surface skin.
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32° C (minus 26° F). Provide products with low compression set and of size and



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shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

**2.5 FILLER:**

- A. Mineral fiber board: ASTM C612, Class 1.
- B. Thickness same as joint width.
- C. Depth to fill void completely behind back-up rod.

**2.6 PRIMER:**

- A. As recommended by manufacturer of caulking or sealant material.
- B. Stain free type.

**2.7 CLEANERS-NON POUROUS SURFACES:**

- A. Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

**PART 3 - EXECUTION**

**3.1 INSPECTION:**

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

**3.2 PREPARATIONS:**

- A. Prepare joints in accordance with manufacturer's instructions and SWRI.
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
  - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.

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2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:

- a. Concrete.

- b. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

- a. Metal.

C. Do not cut or damage joint edges.

D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions.

1. Apply primer prior to installation of back-up rod or bond breaker tape.
2. Use brush or other approved means that will reach all parts of joints.

F. Take all necessary steps to prevent three sided adhesion of sealants.

**3.3 BACKING INSTALLATION:**

- A. Install back-up material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the back-up rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.
- D. Install back-up rod, without puncturing the material, to a uniform depth, within plus or minus 1/8 inch for sealant depths specified.

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E. Where space for back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

F. Take all necessary steps to prevent three sided adhesion of sealants.

**3.4 SEALANT DEPTHS AND GEOMETRY:**

A. At widths up to 1/4 inch, sealant depth equal to width.

**3.5 INSTALLATION:**

A. General:

1. Apply sealants and caulking only when ambient temperature is between 40° and 100° F.
2. Do not use polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
3. Do not use sealant type listed by manufacture as not suitable for use in locations specified.
4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool joints to concave surface unless shown or specified otherwise.
8. Finish paving or floor joints flush unless joint is otherwise detailed.
9. Apply compounds with nozzle size to fit joint width.
10. Test sealants for compatibility with each other and substrate. Use only compatible sealant.

B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise.

C. Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.

1. Apply a 1/4 inch minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.

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3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
4. Openings: Apply a 1/4 inch bead of sealant around all cut-outs to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

**3.6 FIELD QUALITY CONTROL:**

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates as recommended by sealant manufacturer:
  1. Extent of Testing: Test completed elastomeric sealant joints as follows:
    - a. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
- B. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.
- C. Inspect tested joints and report on following:
  1. Whether sealants filled joint cavities and are free from voids.
- D. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
- E. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- F. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

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**3.7 CLEANING:**

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by the caulking or sealant manufacturer.
- B. After filling and finishing joints, remove masking tape.
- C. Leave adjacent surfaces in a clean and unstained condition.

**3.8 LOCATIONS:**

- A. Exterior Building Joints, Horizontal and Vertical:
  - 1. Metal to Metal: Type S-1
- B. Metal Reglets and Flashings:
  - 1. Flashings to Wall: Type S-2
  - 2. Metal to Metal: Type S-2
- C. Sanitary Joints:
  - 1. Walls to Plumbing Fixtures: Type S-3
  - 3. Pipe Penetrations: Type S-3
- D. Interior Caulking:
  - 1. Typical Narrow Joint 1/4 inch or less at Walls and Adjacent Components: Types C-1 and C-2.
  - 2. Perimeter of Doors, Windows, Access Panels which Adjoin Concrete or Masonry Surfaces: Types C-1 and C-2.
  - 4. Perimeter of Lead Faced Control Windows and Plaster or Gypsum Wallboard Walls: Types C-1 and C-2.
  - 5. Exposed Isolation Joints at Top of Full Height Walls: Types C-1 and C-2.
  - 6. Exposed Acoustical Joint at Sound Rated Partitions Type C-2.

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**DIVISION 26**

**ELECTRICAL**





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**SECTION 26 05 11**  
**REQUIREMENTS FOR ELECTRICAL INSTALLATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section applies to all sections of Division 26.
- B. Furnish and install electrical systems, materials, equipment, and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, conductors and cable, switchboards, switchgear, panelboards, motor control centers, generators, automatic transfer switches, and other items and arrangements for the specified items are shown on the drawings.
- C. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the electric utility company's system, and obtain electric utility company approval for sizes and settings of these devices.
- D. Conductor ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways sized per NEC. Aluminum conductors are prohibited.

**1.2 MINIMUM REQUIREMENTS**

- A. The International Building Code (IBC), National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL), and National Fire Protection Association (NFPA) codes and standards are the minimum requirements for materials and installation.
- B. The drawings and specifications shall govern in those instances where requirements are greater than those stated in the above codes and standards.

**1.3 TEST STANDARDS**

- A. All materials and equipment shall be listed, labeled, or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards will be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety

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requirements of a NRTL. Materials and equipment which no NRTL accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as ANSI, NEMA, and NETA. Evidence of compliance shall include certified test reports and definitive shop drawings.

**B. Definitions:**

1. Listed: Materials and equipment included in a list published by an organization that is acceptable to the Authority Having Jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed materials and equipment or periodic evaluation of services, and whose listing states that the materials and equipment either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
2. Labeled: Materials and equipment to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the Authority Having Jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled materials and equipment, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified: Materials and equipment which:
  - a. Have been tested and found by a NRTL to meet nationally recognized standards or to be safe for use in a specified manner.
  - b. Are periodically inspected by a NRTL.
  - c. Bear a label, tag, or other record of certification.
4. Nationally Recognized Testing Laboratory: Testing laboratory which is recognized and approved by the Secretary of Labor in accordance with OSHA regulations.

**1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)**

- A. Manufacturer's Qualifications: The manufacturer shall regularly and currently produce, as one of the manufacturer's principal products, the materials and equipment specified for this project, and shall have manufactured the materials and equipment for at least three years.

**B. Product Qualification:**

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1. Manufacturer's materials and equipment shall have been in satisfactory operation, on three installations of similar size and type as this project, for at least three years.
2. The Government reserves the right to require the Contractor to submit a list of installations where the materials and equipment have been in operation before approval.

C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt of notification that service is needed. Submit name and address of service organizations.

**1.5 APPLICABLE PUBLICATIONS**

- A. Applicable publications listed in all Sections of Division 26 are the latest issue, unless otherwise noted.
- B. Products specified in all sections of Division 26 shall comply with the applicable publications listed in each section.

**1.6 MANUFACTURED PRODUCTS**

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, and for which replacement parts shall be available.
- B. When more than one unit of the same class or type of materials and equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
  1. Components of an assembled unit need not be products of the same manufacturer.
  2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
  3. Components shall be compatible with each other and with the total assembly for the intended service.
  4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. Factory wiring and terminals shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Testing Is Specified:

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1. The Government shall have the option of witnessing factory tests.  
The Contractor shall notify the Government through the COR a minimum of 15 working days prior to the manufacturer's performing the factory tests.
2. Four copies of certified test reports shall be furnished to the COR two weeks prior to final inspection and not more than 90 days after completion of the tests.
3. When materials and equipment fail factory tests, and re-testing and re-inspection is required, the Contractor shall be liable for all additional expenses for the Government to witness re-testing.

**1.7 VARIATIONS FROM CONTRACT REQUIREMENTS**

- A. Where the Government or the Contractor requests variations from the contract requirements, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

**1.8 MATERIALS AND EQUIPMENT PROTECTION**

- A. Materials and equipment shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
  1. Store materials and equipment indoors in clean dry space with uniform temperature to prevent condensation.
  2. During installation, equipment shall be protected against entry of foreign matter, and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
  3. Damaged equipment shall be repaired or replaced, as determined by the COR.
  4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
  5. Damaged paint on equipment shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

**1.9 WORK PERFORMANCE**

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- A. All electrical work shall comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J - General Environmental Controls, OSHA Part 1910 subpart K - Medical and First Aid, and OSHA Part 1910 subpart S - Electrical, in addition to other references required by contract.
- B. Job site safety and worker safety is the responsibility of the Contractor.
- C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required work, the following requirements are mandatory:
  - 1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.
  - 2. Before initiating any work, a job specific work plan must be developed by the Contractor with a peer review conducted and documented by the COR and Medical Center staff. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used, and exit pathways.
  - 3. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the COR.
- D. For work that affects existing electrical systems, arrange, phase and perform work to assure minimal interference with normal functioning of the facility. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.
- E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.
- F. Coordinate location of equipment and conduit with other trades to minimize interference.

**1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS**

- A. Equipment location shall be as close as practical to locations shown on the drawings.

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B. Working clearances shall not be less than specified in the NEC.

C. Inaccessible Equipment:

1. Where the Government determines that the Contractor has installed equipment not readily accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.

2. "Readily accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

D. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the electric utility company's system, and obtain electric utility company approval for sizes and settings of these devices.

**1.11 EQUIPMENT IDENTIFICATION**

A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers, fused and non-fused safety switches, generators, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.

B. Identification signs for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Identification signs for Essential Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 12 mm (1/2 inch) high. Identification signs shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.

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- C. Install adhesive arc flash warning labels on all equipment as required by NFPA 70E. Label shall indicate the arc hazard boundary (inches), working distance (inches), arc flash incident energy at the working distance (calories/cm<sup>2</sup>), required PPE category and description including the glove rating, voltage rating of the equipment, limited approach distance (inches), restricted approach distance (inches), prohibited approach distance (inches), equipment/bus name, date prepared, and manufacturer name and address.

**1.12 SUBMITTALS**

- A. Submit to the COR in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. The Government's approval shall be obtained for all materials and equipment before delivery to the job site. Delivery, storage or installation of materials and equipment which has not had prior approval will not be permitted.
- C. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
1. Mark the submittals, "SUBMITTED UNDER SECTION\_\_\_\_\_".
  2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
  3. Submit each section separately.
- D. The submittals shall include the following:
1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, manuals, pictures, nameplate data, and test reports as required.
  2. Submittals are required for all equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion, etc.) associated with equipment or piping so that the proposed installation can be properly reviewed. Include sufficient fabrication information so that appropriate mounting and securing provisions may be designed and attached to the equipment.

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3. Elementary and interconnection wiring diagrams for communication and signal systems, control systems, and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
4. Parts list which shall include information for replacement parts and ordering instructions, as recommended by the equipment manufacturer.

**E. Maintenance and Operation Manuals:**

1. Submit as required for systems and equipment specified in the technical sections. Furnish in hardcover binders or an approved equivalent.
2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, material, equipment, building, name of Contractor, and contract name and number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the material or equipment.
3. Provide a table of contents and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
4. The manuals shall include:
  - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
  - b. A control sequence describing start-up, operation, and shutdown.
  - c. Description of the function of each principal item of equipment.
  - d. Installation instructions.
  - e. Safety precautions for operation and maintenance.
  - f. Diagrams and illustrations.
  - g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers.
  - h. Performance data.
  - i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare and replacement parts, and name of servicing organization.



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- j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.
- F. Approvals will be based on complete submission of shop drawings, manuals, test reports, certifications, and samples as applicable.
- G. After approval and prior to installation, furnish the COR with one sample of each of the following:
  - 1. A minimum 300 mm (12 inches) length of each type and size of wire and cable along with the tag from the coils or reels from which the sample was taken. The length of the sample shall be sufficient to show all markings provided by the manufacturer.
  - 2. Each type of conduit coupling, bushing, and termination fitting.
  - 3. Conduit hangers, clamps, and supports.
  - 4. Duct sealing compound.
  - 5. Each type of receptacle, toggle switch, lighting control sensor, outlet box, manual motor starter, device wall plate, engraved nameplate, wire and cable splicing and terminating material, and branch circuit single pole molded case circuit breaker.

**1.13 SINGULAR NUMBER**

- A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

**1.14 Polychlorinated biphenyl (PCB) EQUIPMENT (NOT USED)**

**1.15 ACCEPTANCE CHECKS AND TESTS**

- A. The Contractor shall furnish the instruments, materials, and labor for tests.
- B. Where systems are comprised of components specified in more than one section of Division 26, the Contractor shall coordinate the installation, testing, and adjustment of all components between various manufacturer's representatives and technicians so that a complete, functional, and operational system is delivered to the Government.
- C. When test results indicate any defects, the Contractor shall repair or replace the defective materials or equipment, and repeat the tests.

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Repair, replacement, and retesting shall be accomplished at no additional cost to the Government.

**1.16 WARRANTY**

- A. All work performed and all equipment and material furnished under this Division shall be free from defects and shall remain so for a period of one year from the date of acceptance of the entire installation by the Contracting Officer for the Government.

**1.17 INSTRUCTION**

- A. Instruction to designated Government personnel shall be provided for the particular equipment or system as required in each associated technical specification section.
- B. Furnish the services of competent instructors to give full instruction in the adjustment, operation, and maintenance of the specified equipment and system, including pertinent safety requirements. Instructors shall be thoroughly familiar with all aspects of the installation, and shall be trained in operating theory as well as practical operation and maintenance procedures.
- C. A training schedule shall be developed and submitted by the Contractor and approved by the COR at least 30 days prior to the planned training.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

---END---

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**SECTION 26 05 13**  
**MEDIUM-VOLTAGE CABLES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, and connection of medium-voltage cables, indicated as cable or cables in this section, and medium-voltage cable splices and terminations.

**1.2 RELATED WORK**

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for medium-voltage cables.
- D. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Manholes and ducts for medium-voltage cables.
- E. Section 26 12 19, PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS: Medium-voltage cable terminations for use in pad-mounted, liquid-filled, medium-voltage transformers.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 FACTORY TESTS**

- A. Medium-voltage cables shall be thoroughly tested at the factory per NEMA WC 74 to ensure that there are no electrical defects. Factory tests shall be certified.

**1.5 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
1. Shop Drawings:
- a. Submit sufficient information to demonstrate compliance with drawings and specifications.
  - b. Submit the following data for approval:
    - 1) Complete electrical ratings.

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- 2) Installation instructions.
2. Samples:
  - a. After approval and prior to installation, furnish the COR with a sample of each type and size of cable per the requirements of Section 25 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
3. Certifications:
  - a. Factory Test Reports: Submit certified factory production test reports for approval.
  - b. Field Test Reports: Submit field test reports for approval.
  - c. Compatibility: Submit a certificate from the cable manufacturer that the splices and terminations are approved for use with the cable.
  - d. Two weeks prior to final inspection, submit the following.
    - 1) Certification by the manufacturer that the cables, splices, and terminations conform to the requirements of the drawings and specifications.
    - 2) Certification by the Contractor that the cables, splices, and terminations have been properly installed and tested.
    - 3) Certification by the Contractor that each splice and each termination were completely installed in a single continuous work period by a single qualified worker without any overnight interruption.
4. Qualified Worker Approval:
  - a. Qualified workers who install and test cables, splices, and terminations shall have not fewer than five years of experience splicing and terminating cables equivalent to those being spliced and terminated, including experience with the materials in the approved splices and terminations.
  - b. Furnish satisfactory proof of such experience for each qualified worker who splices or terminates the cables.

**1.6 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American Society for Testing and Materials (ASTM):

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B3-01 (2007).....Standard Specification for Soft or Annealed

Copper Wire

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

48-09.....Test Procedures and Requirements for

Alternating-Current Cable Terminations Used on

Shielded Cables Having Laminated Insulation

Rated 2.5 kV through 765 kV or Extruded

Insulation Rated 2.5 kV through 500 kV

386-95.....Separable Insulated Connector Systems for Power

Distribution Systems above 600 V

400-01.....Guide for Field Testing and Evaluation of the

Insulation of Shielded Power Cable Systems

400.2-04.....Guide for Field Testing of Shielded Power Cable

Systems Using Very Low Frequency (VLF)

400.3-06.....Guide for Partial Discharge Testing of Shielded

Power Cable Systems in a Field Environment

404-00.....Extruded and Laminated Dielectric Shielded

Cable Joints Rated 2500 V to 500,000 V

D. National Electrical Manufacturers Association (NEMA):

WC 71-99.....Non-Shielded Cables Rated 2001-5000 Volts for

Use in the Distribution of Electric Energy

WC 74-06.....5-46 KV Shielded Power Cable for Use in the

Transmission and Distribution of Electric

Energy

E. National Fire Protection Association (NFPA):

70-11.....National Electrical Code (NEC)

F. Underwriters Laboratories (UL):

1072-06 .....Medium-Voltage Power Cables

**1.7 SHIPMENT AND STORAGE**

A. Cable shall be shipped on reels such that it is protected from mechanical injury. Each end of each length of cable shall be hermetically sealed with manufacturer's end caps and securely attached to the reel.

B. Cable stored and/or cut on site shall have the ends turned down, and sealed with cable manufacturer's standard cable end seals, or field-installed heat-shrink cable end seals.

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**PART 2 - PRODUCTS**

**2.1 CABLE**

- A. Cable shall be in accordance with the NEC and NEMA WC 71, WC 74, and UL 1072.
- B. Single conductor stranded copper conforming to ASTM B3.
- C. Voltage Rating:
  - 1. 5,000 V cable shall be used on 4,160 V distribution systems.
- D. Insulation:
  - 1. Insulation level shall be 133%.
  - 2. Types of insulation:
    - a. Cable type abbreviation, EPR: Ethylene propylene rubber insulation shall be thermosetting, light and heat stabilized.
    - b. Cable type abbreviation, XLP or XLPE: cross-linked polyethylene insulation shall be thermosetting, light and heat stabilized, and chemically cross-linked.
- E. Insulation shield shall be semi-conducting. Conductor shield shall be semi-conducting.
- F. Insulation shall be wrapped with copper shielding tape, helically-applied over semi-conducting insulation shield.
- G. Heavy duty, overall protective polyvinyl chloride jacket shall enclose every cable. The manufacturer's name, cable type and size, and other pertinent information shall be marked or molded clearly on the overall protective jacket.
- H. Cable temperature ratings for continuous operation, emergency overload operation, and short circuit operation shall be not less than the NEC, NEMA WC 71, or NEMA WC 74 standard for the respective cable.

**2.2 SPLICES AND TERMINATIONS**

- A. Materials shall be compatible with the cables being spliced and terminated, and shall be suitable for the prevailing environmental conditions.
- B. In locations where moisture might be present, the splices shall be watertight. In manholes and pullboxes, the splices shall be submersible.
- C. Splices:
  - 1. Shall comply with IEEE 404. Include all components required for complete splice, with detailed instructions.

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**D. Terminations:**

1. Shall comply with IEEE 48. Include shield ground strap for shielded cable terminations.
2. Class 1 terminations for indoor use: Kit with stress-relief tube, molded-silicone rubber insulator modules, and compression-type connector.
7. Ground metallic cable shields with a device designed for that purpose, consisting of a solderless connector enclosed in watertight rubber housing covering the entire assembly.
8. Provide insulated cable supports to relieve any strain imposed by cable weight or movement. Ground cable supports to the grounding system.

**2.3 FIREPROOFING TAPE**

- A. Fireproofing tape shall be flexible, non-corrosive, self-extinguishing, arcproof, and fireproof intumescent elastomer. Securing tape shall be glass cloth electrical tape not less than 0.18 mm (7 mils) thick, and 19 mm (0.75 inch) wide.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Installation shall be in accordance with the NEC, as shown on the drawings, and per manufacturer's instructions.
- B. Cable shall be installed in conduit above grade and duct bank below grade.
- C. All cables of a feeder shall be pulled simultaneously.
- D. Conductors of different systems (e.g., 5kV and 15kV) shall not be installed in the same raceway.
- E. Splice the cables only in manholes and pullboxes.
- F. Ground shields in accordance with Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- G. Cable maximum pull length, maximum pulling tension, and minimum bend radius shall conform with the recommendations of the manufacturer.
- H. Use suitable lubricating compounds on the cables to prevent pulling damage. Provide compounds that are not injurious to the cable jacket and do not harden or become adhesive.

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- I. Seal the cable ends prior to pulling, to prevent the entry of moisture or lubricant.

**3.2 PROTECTION DURING SPLICING OPERATIONS**

- A. Blowers shall be provided to force fresh air into manholes where free movement or circulation of air is obstructed. Waterproof protective coverings shall be available on the work site to provide protection against moisture while a splice is being made. Pumps shall be used to keep manholes dry during splicing operations. Under no conditions shall a splice or termination be made that exposes the interior of a cable to moisture. A manhole ring at least 150 mm (6 inches) above ground shall be used around the manhole entrance to keep surface water from entering the manhole. Unused ducts shall be plugged and water seepage through ducts in use shall be stopped before splicing.

**3.3 PULLING CABLES IN DUCTS AND MANHOLES**

- A. Cables shall be pulled into ducts with equipment designed for this purpose, including power-driven winches, cable-feeding flexible tube guides, cable grips, pulling eyes, and lubricants. A sufficient number of qualified workers and equipment shall be employed to ensure the careful and proper installation of the cable.
- B. Cable reels shall be set up at the side of the manhole opening and above the duct or hatch level, allowing cables to enter through the opening without reverse bending. Flexible tube guides shall be installed through the opening in a manner that will prevent cables from rubbing on the edges of any structural member.
- C. Cable shall be unreeled from the top of the reel. Pay-out shall be carefully controlled. Cables to be pulled shall be attached through a swivel to the main pulling wire by means of a suitable cable grip and pulling eye.
- D. Woven-wire cable grips shall be used to grip the cable end when pulling small cables and short straight lengths of heavier cables.
- E. Pulling eyes shall be attached to the cable conductors to prevent damage to the cable structure.
- F. Cables shall be liberally coated with a suitable lubricant as they enter the tube guide or duct. Rollers, sheaves, or tube guides around which the cable is pulled shall conform to the minimum bending radius of the cable.



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- G. Cables shall be pulled into ducts at a reasonable speed. Cable pulling using a vehicle shall not be permitted. Pulling operations shall be stopped immediately at any indication of binding or obstruction, and shall not be resumed until the potential for damage to the cable is corrected. Sufficient slack shall be provided for free movement of cable due to expansion or contraction.
- H. Splices in manholes shall be firmly supported on cable racks. Cable ends shall overlap at the ends of a section to provide sufficient undamaged cable for splicing.
- I. Cables cut in the field shall have the cut ends immediately sealed to prevent entrance of moisture.

**3.4 SPLICES AND TERMINATIONS**

- A. Install the materials as recommended by the manufacturer, including precautions pertaining to air temperature and humidity during installation.
- B. Installation shall be accomplished by qualified workers trained to perform medium-voltage equipment installations. Use tools as recommended or provided by the manufacturer. All manufacturer's instructions shall be followed.
- C. Splices in manholes shall be located midway between cable racks on walls of manholes, and supported with cable arms at approximately the same elevation as the enclosing duct.
- D. Where the Government determines that unsatisfactory splices and terminations have been installed, the Contractor shall replace the unsatisfactory splices and terminations with approved material at no additional cost to the Government.

**3.5 FIREPROOFING**

- A. Cover all cable segments exposed in manholes and pullboxes with fireproofing tape.
- B. Apply the tape in a single layer, wrapped in a half-lap manner, or as recommended by the manufacturer. Extend the tape not less than 25 mm (1 inch) into each duct.
- C. At each end of a taped cable section, secure the fireproof tape in place with glass cloth tape.

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**3.6 CIRCUIT IDENTIFICATION OF FEEDERS**

- A. In each manhole and pullbox, install permanent identification tags on each circuit's cables to clearly designate the circuit identification and voltage. The tags shall be the embossed brass type, 40 mm (1.5 inches) in diameter and 40 mils thick. Attach tags with plastic ties. Position the tags so they will be easy to read after the fireproofing tape is installed.

**3.7 ACCEPTANCE CHECKS AND TESTS**

- A. Perform tests in accordance with the manufacturer's recommendations. Include the following visual and electrical inspections.
- B. Test equipment, labor, and technical personnel shall be provided as necessary to perform the acceptance tests. Arrangements shall be made to have tests witnessed by the COR.
- C. Visual Inspection:
  - 1. Inspect exposed sections of cables for physical damage.
  - 2. Inspect shield grounding, cable supports, splices, and terminations.
  - 3. Verify that visible cable bends meet manufacturer's minimum bending radius requirement.
  - 4. Verify installation of fireproofing tape and identification tags.
- D. Electrical Tests:
  - 1. Acceptance tests shall be performed on new and service-aged cables as specified herein.
  - 2. Test new cable after installation, splices, and terminations have been made, but before connection to equipment and existing cable.
- E. Service-Aged Cable Tests:
  - 1. Maintenance tests shall be performed on service-aged cable interconnected to new cable.
  - 2. After new cable test and connection to an existing cable, test the interconnected cable. Disconnect cable from all equipment that could be damaged by the test.
- F. Insulation-Resistance Test: Test all new and service-aged cables with respect to ground and adjacent conductors.
  - 1. Test data shall include megohm readings and leakage current readings. Cables shall not be energized until insulation-resistance test results have been approved by the COR. Test voltages and minimum acceptable resistance values shall be:

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<u>Voltage Class</u>	<u>Test Voltage</u>	<u>Min. Insulation Resistance</u>
5kV	2,500 VDC	1,000 megohms

2. Submit a field test report to the COR that describes the identification and location of cables tested, the test equipment used, and the date tests were performed; identifies the persons who performed the tests; and identifies the insulation resistance and leakage current results for each cable section tested. The report shall provide conclusions and recommendations for corrective action.
- G. Online Partial Discharge Test: Comply with IEEE 400 and 400.3. Test all new and service-aged cables. Perform tests after cables have passed the insulation-resistance test, and after successful energization.
1. Testing shall use a time or frequency domain detection process, incorporating radio frequency current transformer sensors with a partial discharge detection range of 10 kHz to 300 MHz.
  2. Submit a field test report to the COR that describes the identification and location of cables tested, the test equipment used, and the date tests were performed; identifies the persons who performed the tests; and numerically and graphically identifies the magnitude of partial discharge detected for each cable section tested. The report shall provide conclusions and recommendations for corrective action.
- H. Final Acceptance: Final acceptance shall depend upon the satisfactory performance of the cables under test. No cable shall be put into service until all tests are successfully passed, and field test reports have been approved by the COR.

---END---

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**SECTION 26 05 19**  
**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, connection, and testing of the electrical conductors and cables for use in electrical systems rated 600 V and below, indicated as cable(s), conductor(s), wire, or wiring in this section.

**1.2 RELATED WORK**

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for conductors and cables.
- D. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Installation of conductors and cables in manholes and ducts.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 FACTORY TESTS**

- A. Conductors and cables shall be thoroughly tested at the factory per NEMA to ensure that there are no electrical defects. Factory tests shall be certified.

**1.5 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - b. Submit the following data for approval:
      - 1) Electrical ratings and insulation type for each conductor and cable.
      - 2) Splicing materials and pulling lubricant.

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2. Certifications: Two weeks prior to final inspection, submit the following.

- a. Certification by the manufacturer that the conductors and cables conform to the requirements of the drawings and specifications.
- b. Certification by the Contractor that the conductors and cables have been properly installed, adjusted, and tested.

**1.6 APPLICABLE PUBLICATIONS**

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.

B. American Society of Testing Material (ASTM):

D2301-10.....Standard Specification for Vinyl Chloride  
Plastic Pressure-Sensitive Electrical  
Insulating Tape

D2304-10.....Test Method for Thermal Endurance of Rigid  
Electrical Insulating Materials

D3005-10.....Low-Temperature Resistant Vinyl Chloride  
Plastic Pressure-Sensitive Electrical  
Insulating Tape

C. National Electrical Manufacturers Association (NEMA):

WC 70-09.....Power Cables Rated 2000 Volts or Less for the  
Distribution of Electrical Energy

D. National Fire Protection Association (NFPA):

70-11.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):

44-10.....Thermoset-Insulated Wires and Cables

83-08.....Thermoplastic-Insulated Wires and Cables

467-07.....Grounding and Bonding Equipment

486A-486B-03.....Wire Connectors

486C-04.....Splicing Wire Connectors

486D-05.....Sealed Wire Connector Systems

486E-09.....Equipment Wiring Terminals for Use with  
Aluminum and/or Copper Conductors

493-07.....Thermoplastic-Insulated Underground Feeder and  
Branch Circuit Cables

514B-04.....Conduit, Tubing, and Cable Fittings

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**PART 2 - PRODUCTS**

**2.1 CONDUCTORS AND CABLES**

- A. Conductors and cables shall be in accordance with NEMA, UL, as specified herein, and as shown on the drawings.
- B. All conductors shall be copper.
- C. Single Conductor and Cable:
1. No. 12 AWG: Minimum size, except where smaller sizes are specified herein or shown on the drawings.
  2. No. 8 AWG and larger: Stranded.
  3. No. 10 AWG and smaller: Solid; except shall be stranded for final connection to motors, transformers, and vibrating equipment.
  4. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.
- D. Color Code:
1. No. 10 AWG and smaller: Solid color insulation or solid color coating.
  2. No. 8 AWG and larger: Color-coded using one of the following methods:
    - a. Solid color insulation or solid color coating.
    - b. Stripes, bands, or hash marks of color specified.
    - c. Color using 19 mm (0.75 inches) wide tape.
  4. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
  5. Conductors shall be color-coded as follows:

208/120 V	Phase	480/277 V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray *
* or white with colored (other than green) tracer.		

6. Lighting circuit "switch legs", and 3-way and 4-way switch "traveling wires," shall have color coding that is unique and distinct (e.g., pink and purple) from the color coding indicated

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above. The unique color codes shall be solid and in accordance with the NEC. Coordinate color coding in the field with the COR.

**2.2 SPLICES**

- A. Splices shall be in accordance with NEC and UL.
- B. Above Ground Splices for No. 10 AWG and Smaller:
  - 1. Solderless, screw-on, reusable pressure cable type, with integral insulation, approved for copper and aluminum conductors.
  - 2. The integral insulator shall have a skirt to completely cover the stripped conductors.
  - 3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.
- C. Above Ground Splices for No. 8 AWG to No. 4/0 AWG:
  - 1. Compression, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
  - 2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
  - 3. Splice and insulation shall be product of the same manufacturer.
  - 4. All bolts, nuts, and washers used with splices shall be cadmium-plated steel.
- D. Above Ground Splices for 250 kcmil and Larger:
  - 1. Long barrel "butt-splice" or "sleeve" type compression connectors, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.
  - 2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
  - 3. Splice and insulation shall be product of the same manufacturer.
- E. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.

**2.3 CONNECTORS AND TERMINATIONS**

- A. Mechanical type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.

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- B. Long barrel compression type of high conductivity and corrosion-resistant material, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.
- C. All bolts, nuts, and washers used to connect connections and terminations to bus bars or other termination points shall cadmium-plated steel.

**2.4 CONTROL WIRING**

- A. Unless otherwise specified elsewhere in these specifications, control wiring shall be as specified herein, except that the minimum size shall be not less than No. 14 AWG.
- B. Control wiring shall be sized such that the voltage drop under in-rush conditions does not adversely affect operation of the controls.

**2.5 WIRE LUBRICATING COMPOUND**

- A. Lubricating compound shall be suitable for the wire insulation and conduit, and shall not harden or become adhesive.
- B. Shall not be used on conductors for isolated power systems.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Install conductors in accordance with the NEC, as specified, and as shown on the drawings.
- B. Install all conductors in raceway systems.
- C. Splice conductors only in outlet boxes, junction boxes, pullboxes, manholes, or handholes.
- D. Conductors of different systems (e.g., 120 V and 277 V) shall not be installed in the same raceway.
- E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.
- F. In panelboards, cabinets, wireways, switches, enclosures, and equipment assemblies, neatly form, train, and tie the conductors with non-metallic ties.
- G. For connections to motors, transformers, and vibrating equipment, stranded conductors shall be used only from the last fixed point of connection to the motors, transformers, or vibrating equipment.



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H. Use expanding foam or non-hardening duct-seal to seal conduits entering a building, after installation of conductors.

I. Conductor and Cable Pulling:

1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling. Use lubricants approved for the cable.
2. Use nonmetallic pull ropes.
3. Attach pull ropes by means of either woven basket grips or pulling eyes attached directly to the conductors.
4. All conductors in a single conduit shall be pulled simultaneously.
5. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

J. No more than three branch circuits shall be installed in any one conduit.

K. When stripping stranded conductors, use a tool that does not damage the conductor or remove conductor strands.

**3.2 INSTALLATION IN MANHOLES**

A. Train the cables around the manhole walls, but do not bend to a radius less than six times the overall cable diameter.

**3.3 SPLICE AND TERMINATION INSTALLATION**

A. Splices and terminations shall be mechanically and electrically secure, and tightened to manufacturer's published torque values using a torque screwdriver or wrench.

B. Where the Government determines that unsatisfactory splices or terminations have been installed, replace the splices or terminations at no additional cost to the Government.

**3.4 CONDUCTOR IDENTIFICATION**

A. When using colored tape to identify phase, neutral, and ground conductors larger than No. 8 AWG, apply tape in half-overlapping turns for a minimum of 75 mm (3 inches) from terminal points, and in junction boxes, pullboxes, and manholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable, stating size and insulation type.

**3.5 FEEDER CONDUCTOR IDENTIFICATION**

A. In each interior pullbox and each underground manhole and handhole, install brass tags on all feeder conductors to clearly designate their

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circuit identification and voltage. The tags shall be the embossed type, 40 mm (1-1/2 inches) in diameter and 40 mils thick. Attach tags with plastic ties.

**3.6 EXISTING CONDUCTORS**

- A. Unless specifically indicated on the plans, existing conductors shall not be reused.

**3.7 CONTROL WIRING INSTALLATION**

- A. Unless otherwise specified in other sections, install control wiring and connect to equipment to perform the required functions as specified or as shown on the drawings.
- B. Install a separate power supply circuit for each system, except where otherwise shown on the drawings.

**3.8 CONTROL WIRING IDENTIFICATION**

- A. Install a permanent wire marker on each wire at each termination.
- B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
- C. Wire markers shall retain their markings after cleaning.
- D. In each manhole and handhole, install embossed brass tags to identify the system served and function.

**3.9 ACCEPTANCE CHECKS AND TESTS**

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
  - 1. Visual Inspection and Tests: Inspect physical condition.
  - 2. Electrical tests:
    - a. After installation but before connection to utilization devices, such as fixtures, motors, or appliances, test conductors phase-to-phase and phase-to-ground resistance with an insulation resistance tester. Existing conductors to be reused shall also be tested.
    - b. Applied voltage shall be 500 V DC for 300 V rated cable, and 1000 V DC for 600 V rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300 V rated cable and 100 megohms for 600 V rated cable.
    - c. Perform phase rotation test on all three-phase circuits.

---END---

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**SECTION 26 05 26**  
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, connection, and testing of grounding and bonding equipment, indicated as grounding equipment in this section.
- B. "Grounding electrode system" refers to grounding electrode conductors and all electrodes required or allowed by NEC, as well as made, supplementary, and lightning protection system grounding electrodes.
- C. The terms "connect" and "bond" are used interchangeably in this section and have the same meaning.

**1.2 RELATED WORK**

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.
- C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.
- D. Section 26 12 19, PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS: pad-mounted, liquid-filled, medium-voltage transformers.
- E. Section 26 22 00, LOW-VOLTAGE TRANSFORMERS: Low-voltage transformers.
- F. Section 26 24 13, DISTRIBUTION SWITCHBOARDS: Low-voltage distribution switchboards.
- G. Section 26 24 16, PANELBOARDS: Low-voltage panelboards.
- H. Section 26 36 23, AUTOMATIC TRANSFER SWITCHES: Automatic transfer switches.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.

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- b. Submit plans showing the location of system grounding electrodes and connections, and the routing of aboveground and underground grounding electrode conductors.
2. Test Reports:
  - a. Two weeks prior to the final inspection, submit ground resistance field test reports to the COR
3. Certifications:
  - a. Certification by the Contractor that the grounding equipment has been properly installed and tested.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American Society for Testing and Materials (ASTM):
  - B1-07.....Standard Specification for Hard-Drawn Copper Wire
  - B3-07.....Standard Specification for Soft or Annealed Copper Wire
  - B8-11.....Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
  - 81-83.....IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part 1: Normal Measurements
- D. National Fire Protection Association (NFPA):
  - 70-11.....National Electrical Code (NEC)
  - 70E-12.....National Electrical Safety Code
  - 99-12.....Health Care Facilities
- E. Underwriters Laboratories, Inc. (UL):
  - 44-10 .....Thermoset-Insulated Wires and Cables
  - 83-08 .....Thermoplastic-Insulated Wires and Cables
  - 467-07 .....Grounding and Bonding Equipment

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**PART 2 - PRODUCTS**

**2.1 GROUNDING AND BONDING CONDUCTORS**

- A. Equipment grounding conductors shall be insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be identified per NEC.
- B. Bonding conductors shall be bare stranded copper, except that sizes No. 10 AWG and smaller shall be bare solid copper. Bonding conductors shall be stranded for final connection to motors, transformers, and vibrating equipment.
- C. Conductor sizes shall not be less than shown on the drawings, or not less than required by the NEC, whichever is greater.
- D. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

**2.2 GROUND RODS**

- A. Stainless steel, 19 mm (0.75 inch) diameter by 3 M (10 feet) long.
- B. Quantity of rods shall be as shown on the drawings, and as required to obtain the specified ground resistance.

**2.4 GROUND CONNECTIONS**

- A. Below Grade and Inaccessible Locations: Exothermic-welded type connectors.
- B. Above Grade:
  - 1. Bonding Jumpers: Listed for use with aluminum and copper conductors. For wire sizes No. 8 AWG and larger, use compression-type connectors. For wire sizes smaller than No. 8 AWG, use mechanical type lugs. Connectors or lugs shall use cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
  - 2. Connection to Building Steel: Exothermic-welded type connectors.
  - 3. Connection to Grounding Bus Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
  - 4. Connection to Equipment Rack and Cabinet Ground Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with

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cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

**2.5 EQUIPMENT RACK AND CABINET GROUND BARS**

- A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks. Ground bars shall have minimum dimensions of 6.3 mm (0.25 inch) thick x 19 mm (0.75 inch) wide, with length as required or as shown on the drawings. Provide insulators and mounting brackets.

**2.6 GROUND TERMINAL BLOCKS**

- A. At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide mechanical type lugs, with cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

**2.7 GROUNDING BUS BAR**

- A. Pre-drilled rectangular copper bar with stand-off insulators, minimum 6.3 mm (0.25 inch) thick x 100 mm (4 inches) high in cross-section, length as shown on the drawings, with hole size, quantity, and spacing per detail shown on the drawings. Provide insulators and mounting brackets.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Install grounding equipment in accordance with the NEC, as shown on the drawings, and as specified herein.
- B. System Grounding:
  - 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformer.
  - 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
- C. Equipment Grounding: Metallic piping, building structural steel, electrical enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

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**3.2 INACCESSIBLE GROUNDING CONNECTIONS**

- A. Make grounding connections, which are normally buried or otherwise inaccessible, by exothermic weld.

**3.3 MEDIUM-VOLTAGE EQUIPMENT AND CIRCUITS**

- A. Switchgear: Provide a bare grounding electrode conductor from the switchgear ground bus to the grounding electrode system.
- B. Duct Banks and Manholes: Provide an insulated equipment grounding conductor in each duct containing medium-voltage conductors, sized per NEC except that minimum size shall be No. 2 AWG. Bond the equipment grounding conductors to the switchgear ground bus, to all manhole grounding provisions and hardware, to the cable shield grounding provisions of medium-voltage cable splices and terminations, and to equipment enclosures.
- C. Pad-Mounted Transformers:
  - 1. Provide a driven ground rod and bond with a grounding electrode conductor to the transformer grounding pad.
  - 2. Ground the secondary neutral.
- D. Lightning Arresters: Connect lightning arresters to the equipment ground bus or ground rods as applicable.

**3.4 SECONDARY VOLTAGE EQUIPMENT AND CIRCUITS**

- A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.
- B. Metallic Piping, Building Structural Steel, and Supplemental Electrode(s):
  - 1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water pipe systems, building structural steel, and supplemental or made electrodes. Provide jumpers across insulating joints in the metallic piping.
  - 2. Provide a supplemental ground electrode as shown on the drawings and bond to the grounding electrode system.
- C. Switchgear, Switchboards, Unit Substations, Panelboards, Motor Control Centers, Engine-Generators, Automatic Transfer Switches, and other electrical equipment:
  - 1. Connect the equipment grounding conductors to the ground bus.
  - 2. Connect metallic conduits by grounding bushings and equipment grounding conductor to the equipment ground bus.

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D. Transformers:

1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the ground bar at the service equipment

**3.5 RACEWAY**

A. Conduit Systems:

1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
2. Non-metallic conduit systems, except non-metallic feeder conduits that carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.
3. Metallic conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.
4. Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a equipment grounding conductor to the equipment ground bus.

B. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, and power and lighting branch circuits.

C. Boxes, Cabinets, Enclosures, and Panelboards:

1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
2. Provide lugs in each box and enclosure for equipment grounding conductor termination.

D. Wireway Systems:

1. Bond the metallic structures of wireway to provide electrical continuity throughout the wireway system, by connecting a No. 6 AWG



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bonding jumper at all intermediate metallic enclosures and across all section junctions.

2. Install insulated No. 6 AWG bonding jumpers between the wireway system, bonded as required above, and the closest building ground at each end and approximately every 16 M (50 feet).
  3. Use insulated No. 6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.
  4. Use insulated No. 6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 M (49 feet).
- E. Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.
- F. Ground lighting fixtures to the equipment grounding conductor of the wiring system. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.
- G. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

**3.6 OUTDOOR METALLIC FENCES AROUND ELECTRICAL EQUIPMENT**

- A. Fences shall be grounded with a ground rod at each fixed gate post and at each corner post.
- B. Drive ground rods until the top is 300 mm (12 inches) below grade. Attach a No. 4 AWG copper conductor by exothermic weld to the ground rods, and extend underground to the immediate vicinity of fence post. Lace the conductor vertically into 300 mm (12 inches) of fence mesh and fasten by two approved bronze compression fittings, one to bond the wire to post and the other to bond the wire to fence. Each gate section shall be bonded to its gatepost by a 3 mm x 25 mm (0.375 inch x 1 inch) flexible, braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

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**3.7 CORROSION INHIBITORS**

- A. When making grounding and bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

**3.8 CONDUCTIVE PIPING**

- A. Bond all conductive piping systems, interior and exterior, to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.
- B. In operating rooms and at intensive care and coronary care type beds, bond the medical gas piping and medical vacuum piping at the outlets directly to the patient ground bus.

**3.9 MAIN ELECTRICAL ROOM GROUNDING**

- A. Provide ground bus bar and mounting hardware at each main electrical room where incoming feeders are terminated, as shown on the drawings. Connect to pigtail extensions of the building grounding ring, as shown on the drawings.

**3.10 GROUND RESISTANCE**

- A. Grounding system resistance to ground shall not exceed 5 ohms. Make any modifications or additions to the grounding electrode system necessary for compliance without additional cost to the Government. Final tests shall ensure that this requirement is met.
- B. Grounding system resistance shall comply with the electric utility company ground resistance requirements.

**3.11 GROUND ROD INSTALLATION**

- A. For outdoor installations, drive each rod vertically in the earth, until top of rod is 610 mm (24 inches) below final grade.
- B. For indoor installations, leave 100 mm (4 inches) of each rod exposed.
- C. Where buried or permanently concealed ground connections are required, make the connections by the exothermic process, to form solid metal joints. Make accessible ground connections with mechanical pressure-type ground connectors.
- D. Where rock or impenetrable soil prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified ground resistance.

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**3.12 ACCEPTANCE CHECKS AND TESTS**

- A. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized or connected to the electric utility company ground system, and shall be made in normally dry conditions not fewer than 48 hours after the last rainfall.
- B. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.
- C. Below-grade connections shall be visually inspected by the COR prior to backfilling. The Contractor shall notify the COR 24 hours before the connections are ready for inspection.

---END---

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**SECTION 26 05 33**  
**RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes, to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.
- B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

**1.2 RELATED WORK**

- A. Section 07 92 00, JOINT SEALANTS: Sealing around conduit penetrations through the building envelope to prevent moisture migration into the building.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- D. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Underground conduits.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Shop Drawings:
    - a. Size and location of main feeders.
    - b. Size and location of panels and pull-boxes.
    - c. Layout of required conduit penetrations through structural elements.
    - d. Submit the following data for approval:
      - 1) Raceway types and sizes.
      - 2) Conduit bodies, connectors and fittings.

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- 3) Junction and pull boxes, types and sizes.
2. Certifications: Two weeks prior to final inspection, submit the following:
  - a. Certification by the manufacturer that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment conform to the requirements of the drawings and specifications.
  - b. Certification by the Contractor that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment have been properly installed.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American National Standards Institute (ANSI):
  - C80.1-05.....Electrical Rigid Steel Conduit
  - C80.3-05.....Steel Electrical Metal Tubing
  - C80.6-05.....Electrical Intermediate Metal Conduit
- C. National Fire Protection Association (NFPA):
  - 70-11.....National Electrical Code (NEC)
- D. Underwriters Laboratories, Inc. (UL):
  - 1-05.....Flexible Metal Conduit
  - 5-11.....Surface Metal Raceway and Fittings
  - 6-07.....Electrical Rigid Metal Conduit - Steel
  - 50-95.....Enclosures for Electrical Equipment
  - 360-13.....Liquid-Tight Flexible Steel Conduit
  - 467-13.....Grounding and Bonding Equipment
  - 514A-13.....Metallic Outlet Boxes
  - 514B-12.....Conduit, Tubing, and Cable Fittings
  - 514C-07.....Nonmetallic Outlet Boxes, Flush-Device Boxes  
and Covers
  - 651-11.....Schedule 40 and 80 Rigid PVC Conduit and  
Fittings
  - 651A-11.....Type EB and A Rigid PVC Conduit and HDPE  
Conduit

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797-07.....Electrical Metallic Tubing

1242-06.....Electrical Intermediate Metal Conduit - Steel

E. National Electrical Manufacturers Association (NEMA):

TC-2-13.....Electrical Polyvinyl Chloride (PVC) Tubing and  
Conduit

TC-3-13.....PVC Fittings for Use with Rigid PVC Conduit and  
Tubing

FB1-12.....Fittings, Cast Metal Boxes and Conduit Bodies  
for Conduit, Electrical Metallic Tubing and  
Cable

FB2.10-13.....Selection and Installation Guidelines for  
Fittings for use with Non-Flexible Conduit or  
Tubing (Rigid Metal Conduit, Intermediate  
Metallic Conduit, and Electrical Metallic  
Tubing)

FB2.20-12.....Selection and Installation Guidelines for  
Fittings for use with Flexible Electrical  
Conduit and Cable

F. American Iron and Steel Institute (AISI):

S100-2007.....North American Specification for the Design of  
Cold-Formed Steel Structural Members.

**PART 2 - PRODUCTS**

**2.1 MATERIAL**

A. Conduit Size: In accordance with the NEC, but not less than 13 mm  
(0.5-inch) unless otherwise shown. Where permitted by the NEC, 13 mm  
(0.5-inch) flexible conduit may be used for tap connections to recessed  
lighting fixtures.

B. Conduit:

1. Size: In accordance with the NEC, but not less than 13 mm (0.5-  
inch).

2. Rigid Steel Conduit (RMC): Shall conform to UL 6 and ANSI C80.1.

4. Rigid Intermediate Steel Conduit (IMC): Shall conform to UL 1242  
and ANSI C80.6.

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5. Electrical Metallic Tubing (EMT): Shall conform to UL 797 and ANSI C80.3. Maximum size not to exceed 105 mm (4 inches) and shall be permitted only with cable rated 600 V or less.
6. Flexible Metal Conduit: Shall conform to UL 1.
7. Liquid-tight Flexible Metal Conduit: Shall conform to UL 360.
8. Direct Burial Plastic Conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high density polyethylene (PE).
9. Surface Metal Raceway: Shall conform to UL 5.

C. Conduit Fittings:

1. Rigid Steel and Intermediate Metallic Conduit Fittings:
  - a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
  - b. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
  - c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
  - d. Bushings: Metallic insulating type, consisting of an insulating insert, molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
  - e. Erickson (Union-Type) and Set Screw Type Couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case-hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
  - f. Sealing Fittings: Threaded cast iron type. Use continuous drain-type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.
3. Electrical Metallic Tubing Fittings:
  - a. Fittings and conduit bodies shall meet the requirements of UL 514B, ANSI C80.3, and NEMA FB1.
  - b. Only steel or malleable iron materials are acceptable.

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- c. Setscrew Couplings and Connectors: Use setscrews of case-hardened steel with hex head and cup point, to firmly seat in wall of conduit for positive grounding.
- d. Indent-type connectors or couplings are prohibited.
- e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
- 4. Flexible Metal Conduit Fittings:
  - a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
  - b. Clamp-type, with insulated throat.
- 5. Liquid-tight Flexible Metal Conduit Fittings:
  - a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
  - b. Only steel or malleable iron materials are acceptable.
  - c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
- 6. Direct Burial Plastic Conduit Fittings: Fittings shall meet the requirements of UL 514C and NEMA TC3.
- 7. Surface Metal Raceway Fittings: As recommended by the raceway manufacturer. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, conduit entry fittings, accessories, and other fittings as required for complete system.
- 8. Expansion and Deflection Couplings:
  - a. Conform to UL 467 and UL 514B.
  - b. Accommodate a 19 mm (0.75-inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
  - c. Include internal flexible metal braid, sized to guarantee conduit ground continuity and a low-impedance path for fault currents, in accordance with UL 467 and the NEC tables for equipment grounding conductors.
  - d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat-resistant molded rubber material with stainless steel jacket clamps.

**D. Conduit Supports:**



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1. Parts and Hardware: Zinc-coat or provide equivalent corrosion protection.
  2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
  3. Multiple Conduit (Trapeze) Hangers: Not less than 38 mm x 38 mm (1.5 x 1.5 inches), 12-gauge steel, cold-formed, lipped channels; with not less than 9 mm (0.375-inch) diameter steel hanger rods.
  4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.
- E. Outlet, Junction, and Pull Boxes:
1. UL-50 and UL-514A.
  2. Rustproof cast metal where required by the NEC or shown on drawings.
  3. Sheet Metal Boxes: Galvanized steel, except where shown on drawings.
- F. Metal Wireways: Equip with hinged covers, except as shown on drawings. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for a complete system.

**PART 3 - EXECUTION**

**3.1 PENETRATIONS**

- A. Cutting or Holes:
1. Cut holes in advance where they should be placed in the structural elements, such as ribs or beams. Obtain the approval of the COR prior to drilling through structural elements.
  2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammers, impact electric, hand, or manual hammer-type drills are not allowed, except when permitted by the COR where working space is limited.
- B. Firestop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases.

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- C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal the gap around conduit to render it watertight, as specified in Section 07 92 00, JOINT SEALANTS.

**3.2 INSTALLATION, GENERAL**

- A. In accordance with UL, NEC, NEMA, as shown on drawings, and as specified herein.
- B. Raceway systems used for Essential Electrical Systems (EES) shall be entirely independent of other raceway systems.
- C. Install conduit as follows:
1. In complete mechanically and electrically continuous runs before pulling in cables or wires.
  2. Unless otherwise indicated on the drawings or specified herein, installation of all conduits shall be concealed within finished walls, floors, and ceilings.
  3. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new conduits.
  4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
  5. Cut conduits square, ream, remove burrs, and draw up tight.
  6. Independently support conduit at 2.4 M (8 feet) on centers with specified materials and as shown on drawings.
  7. Do not use suspended ceilings, suspended ceiling supporting members, lighting fixtures, other conduits, cable tray, boxes, piping, or ducts to support conduits and conduit runs.
  8. Support within 300 mm (12 inches) of changes of direction, and within 300 mm (12 inches) of each enclosure to which connected.
  9. Close ends of empty conduits with plugs or caps at the rough-in stage until wires are pulled in, to prevent entry of debris.
  10. Conduit installations under fume and vent hoods are prohibited.
  11. Secure conduits to cabinets, junction boxes, pull-boxes, and outlet boxes with bonding type locknuts. For rigid steel and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
  12. Conduit bodies shall only be used for changes in direction, and shall not contain splices.

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13. Do not use aluminum conduits in wet locations.

D. Conduit Bends:

1. Make bends with standard conduit bending machines.
2. Conduit hickey may be used for slight offsets and for straightening stubbed out conduits.
3. Bending of conduits with a pipe tee or vise is prohibited.

E. Layout and Homeruns:

1. Install conduit with wiring, including homeruns, as shown on drawings.
2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted and approved by the COR.

**3.3 CONCEALED WORK INSTALLATION**

A. In Concrete:

1. Conduit: Rigid steel, IMC, or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel, or vapor barriers.
2. Align and run conduit in direct lines.
3. Install conduit through concrete beams only:
  - a. Where shown on the structural drawings.
  - b. As approved by the COR prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
4. Installation of conduit in concrete that is less than 75 mm (3 inches) thick is prohibited.
  - a. Conduit outside diameter larger than one-third of the slab thickness is prohibited.
  - b. Space between conduits in slabs: Approximately six conduit diameters apart, and one conduit diameter at conduit crossings.
  - c. Install conduits approximately in the center of the slab so that there will be a minimum of 19 mm (0.75-inch) of concrete around the conduits.
5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to ensure low resistance ground continuity through the conduits. Tightening setscrews with pliers is prohibited.

B. Above Furred or Suspended Ceilings and in Walls:

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1. Conduit for Conductors Above 600 V: Rigid steel—Mixing different types of conduits in the same system is prohibited.
2. Conduit for Conductors 600 V and Below: Rigid steel, IMC, or EMT. Mixing different types of conduits in the same system is prohibited.
3. Align and run conduit parallel or perpendicular to the building lines.
4. Connect recessed lighting fixtures to conduit runs with maximum 1.8 M (6 feet) of flexible metal conduit extending from a junction box to the fixture.
5. Tightening set screws with pliers is prohibited.
6. For conduits running through metal studs, limit field cut holes to no more than 70% of web depth. Spacing between holes shall be at least 457 mm (18 inches). Cuts or notches in flanges or return lips shall not be permitted.

**3.4 EXPOSED WORK INSTALLATION**

- A. Unless otherwise indicated on drawings, exposed conduit is only permitted in mechanical and electrical rooms.
- B. Conduit for Conductors Above 600 V: Rigid steelMixing different types of conduits in the system is prohibited.
- C. Conduit for Conductors 600 V and Below: Rigid steel, IMC, or EMT. Mixing different types of conduits in the system is prohibited.
- D. Align and run conduit parallel or perpendicular to the building lines.
- E. Install horizontal runs close to the ceiling or beams and secure with conduit straps.
- F. Support horizontal or vertical runs at not over 2.4 M (8 feet) intervals.
- G. Surface Metal Raceways: Use only where shown on drawings.
- H. Painting:
  1. Paint exposed conduit as specified in Section 09 91 00, PAINTING.
  2. Paint all conduits containing cables rated over 600 V safety orange. Refer to Section 09 91 00, PAINTING for preparation, paint type, and exact color. In addition, paint legends, using 50 mm (2 inch) high black numerals and letters, showing the cable voltage rating. Provide legends where conduits pass through walls and floors and at maximum 6 M (20 feet) intervals in between.

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**3.5 DIRECT BURIAL INSTALLATION**

- A. Refer to Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION.

**3.6 HAZARDOUS LOCATIONS**

- A. Use rigid steel conduit only.
- B. Install UL approved sealing fittings that prevent passage of explosive vapors in hazardous areas equipped with explosion-proof lighting fixtures, switches, and receptacles, as required by the NEC.

**3.7 WET OR DAMP LOCATIONS**

- A. Use rigid steel or IMC conduits unless as shown on drawings.
- B. Provide sealing fittings to prevent passage of water vapor where conduits pass from warm to cold locations, i.e., refrigerated spaces, constant-temperature rooms, air-conditioned spaces, building exterior walls, roofs, or similar spaces.
- C. Use rigid steel or IMC conduit within 1.5 M (5 feet) of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers, unless as shown on drawings. Conduit shall be half-lapped with 10 mil PVC tape before installation. After installation, completely recoat or retape any damaged areas of coating.
- D. Conduits run on roof shall be supported with integral galvanized lipped steel channel, attached to UV-inhibited polycarbonate or polypropylene blocks every 2.4 M (8 feet) with 9 mm (3/8-inch) galvanized threaded rods, square washer and locknut. Conduits shall be attached to steel channel with conduit clamps.

**3.8 MOTORS AND VIBRATING EQUIPMENT**

- A. Use flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.
- B. Use liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside airstream of HVAC units, and locations subject to seepage or dripping of oil, grease, or water.
- C. Provide a green equipment grounding conductor with flexible and liquid-tight flexible metal conduit.

**3.9 EXPANSION JOINTS**

- A. Conduits 75 mm (3 inch) and larger that are secured to the building structure on opposite sides of a building expansion joint require

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expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.

- B. Provide conduits smaller than 75 mm (3 inch) with junction boxes on both sides of the expansion joint. Connect flexible metal conduits to junction boxes with sufficient slack to produce a 125 mm (5 inch) vertical drop midway between the ends of the flexible metal conduit. Flexible metal conduit shall have a green insulated copper bonding jumper installed. In lieu of this flexible metal conduit, expansion and deflection couplings as specified above are acceptable.
- C. Install expansion and deflection couplings where shown.

**3.10 CONDUIT SUPPORTS**

- A. Safe working load shall not exceed one-quarter of proof test load of fastening devices.
- B. Use pipe straps or individual conduit hangers for supporting individual conduits.
- C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and an additional 90 kg (200 lbs). Attach each conduit with U-bolts or other approved fasteners.
- D. Support conduit independently of junction boxes, pull-boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.
- E. Fasteners and Supports in Solid Masonry and Concrete:
  - 1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
  - 2. Existing Construction:
    - a. Steel expansion anchors not less than 6 mm (0.25-inch) bolt size and not less than 28 mm (1.125 inch) in embedment.
    - b. Power set fasteners not less than 6 mm (0.25-inch) diameter with depth of penetration not less than 75 mm (3 inch).
    - c. Use vibration and shock-resistant anchors and fasteners for attaching to concrete ceilings.
- F. Hollow Masonry: Toggle bolts.
- G. Bolts supported only by plaster or gypsum wallboard are not acceptable.
- H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

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- I. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
- J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
- K. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.
- L. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

**3.11 BOX INSTALLATION**

- A. Boxes for Concealed Conduits:
  - 1. Flush-mounted.
  - 2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operations or where more than the equivalent of 4-90 degree bends are necessary.
- C. Locate pullboxes so that covers are accessible and easily removed. Coordinate locations with piping and ductwork where installed above ceilings.
- D. Remove only knockouts as required. Plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- E. Outlet boxes mounted back-to-back in the same wall are prohibited. A minimum 600 mm (24 inch) center-to-center lateral spacing shall be maintained between boxes.
- F. Flush-mounted wall or ceiling boxes shall be installed with raised covers so that the front face of raised cover is flush with the wall. Surface-mounted wall or ceiling boxes shall be installed with surface-style flat or raised covers.
- G. Minimum size of outlet boxes for ground fault circuit interrupter (GFCI) receptacles is 100 mm (4 inches) square x 55 mm (2.125 inches) deep, with device covers for the wall material and thickness involved.

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- H. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example "SIG-FA JB No. 1."
- I. On all branch circuit junction box covers, identify the circuits with black marker.

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**SECTION 26 05 41**

**UNDERGROUND ELECTRICAL CONSTRUCTION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, and connection of underground ducts and raceways, and precast manholes and pullboxes to form a complete underground electrical raceway system.
- B. The terms "duct" and "conduit" are used interchangeably in this section.

**1.2 RELATED WORK**

- A. Section 07 92 00, JOINT SEALANTS: Sealing of conduit penetrations.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Coordinate layout and installation of ducts, manholes, and pullboxes with final arrangement of other utilities, site grading, and surface features.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - b. Submit information on manholes, pullboxes, ducts, and hardware. Submit manhole plan and elevation drawings, showing openings, pulling irons, cable supports, cover, ladder, sump, and other accessories.
    - c. Proposed deviations from the drawings shall be clearly marked on the submittals. If it is necessary to locate manholes, pullboxes, or duct banks at locations other than shown on the drawings, show

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the proposed locations accurately on scaled site drawings, and  
submit to the COR for approval prior to construction.

2. Certifications: Two weeks prior to the final inspection, submit the following.
  - a. Certification by the manufacturer that the materials conform to the requirements of the drawings and specifications.
  - b. Certification by the Contractor that the materials have been properly installed, connected, and tested.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American Concrete Institute (ACI):  
Building Code Requirements for Structural Concrete  
318-11/318M-11.....Building Code Requirements for Structural  
Concrete & Commentary  
SP-66-04.....ACI Detailing Manual
- C. American National Standards Institute (ANSI):  
77-10.....Underground Enclosure Integrity
- D. American Society for Testing and Materials (ASTM):  
C478-12.....Standard Specification for Precast Reinforced  
Concrete Manhole Sections  
C858-10e1.....Underground Precast Concrete Utility Structures  
C990-09.....Joints for Concrete Pipe, Manholes and Precast  
Box Sections Using Preformed Flexible Joint  
Sealants.
- E. National Electrical Manufacturers Association (NEMA):  
TC 2-03.....Electrical Polyvinyl Chloride (PVC) Conduit  
TC 3-04.....Polyvinyl Chloride (PVC) Fittings for Use With  
Rigid PVC Conduit And Tubing  
TC 6 & 8-03.....Polyvinyl Chloride (PVC) Plastic Utilities Duct  
For Underground Installations  
TC 9-04.....Fittings For Polyvinyl Chloride (PVC) Plastic  
Utilities Duct For Underground Installation
- F. National Fire Protection Association (NFPA):

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70-11.....National Electrical Code (NEC)

70E-12.....National Electrical Safety Code

G. Underwriters Laboratories, Inc. (UL):

6-07.....Electrical Rigid Metal Conduit-Steel

467-07.....Grounding and Bonding Equipment

651-11.....Schedule 40, 80, Type EB and A Rigid PVC

Conduit and Fittings

651A-11.....Schedule 40 and 80 High Density Polyethylene

(HDPE) Conduit

651B-07.....Continuous Length HDPE Conduit

**PART 2 - PRODUCTS**

**2.1 PRE-CAST CONCRETE MANHOLES AND HARDWARE**

A. Structure: Factory-fabricated, reinforced-concrete, monolithically-poured walls and bottom. Frame and cover shall form top of manhole.

B. Cable Supports:

1. Cable stanchions shall be hot-rolled, heavy duty, hot-dipped galvanized "T" section steel, 56 mm (2.25 inches) x 6 mm (0.25 inch) in size, and punched with 14 holes on 38 mm (1.5 inches) centers for attaching cable arms.

2. Cable arms shall be 5 mm (0.1875 inch) gauge, hot-rolled, hot-dipped galvanized sheet steel, pressed to channel shape. Arms shall be approximately 63 mm (2.5 inches) wide x 350 mm (14 inches) long.

3. Insulators for cable supports shall be porcelain, and shall be saddle type or type that completely encircles the cable.

4. Equip each cable stanchion with one spare cable arm, with three spare insulators for future use.

C. Ladder: Aluminum with 400 mm (16 inches) rung spacing. Provide securely-mounted ladder for every manhole over 1.2 M (4 feet) deep.

D. Ground Rod Sleeve: Provide a 75 mm (3 inches) PVC sleeve in manhole floors so that a driven ground rod may be installed.

E. Sump: Provide 305 mm x 305 mm (12 inches x 12 inches) covered sump frame and grated cover.

**2.2 PULLBOXES**

A. General: Size as indicated on the drawings. Provide pullboxes with weatherproof, non-skid covers with recessed hook eyes, secured with

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corrosion- and tamper-resistant hardware. Cover material shall be identical to pullbox material. Covers shall have molded lettering, ELECTRIC or SIGNAL as applicable. Pullboxes shall comply with the requirements of ANSI 77 Tier 22 loading. Provide pulling irons, 22 mm (0.875 inch) diameter galvanized steel bar with exposed triangular-shaped opening.

**2.3 DUCTS**

- A. Number and sizes shall be as shown on the drawings.
- B. Ducts (concrete-encased):
  - 1. Plastic Duct:
    - a. UL 651 and 651A Schedule 40 PVC conduit.
    - b. Duct shall be suitable for use with 90° C (194° F) rated conductors.
  - 2. Conduit Spacers: Prefabricated plastic.

**2.4 GROUNDING**

- A. Ground Rods and Ground Wire: Per Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

**2.5 WARNING TAPE**

- A. 4-mil polyethylene 75 mm (3 inches) wide detectable tape, red with black letters, imprinted with "CAUTION - BURIED ELECTRIC CABLE BELOW" or similar.

**2.6 PULL ROPE FOR SPARE DUCTS**

- A. Plastic with 890 N (200 lb) minimum tensile strength.

**PART 3 - EXECUTION**

**3.1 MANHOLE AND PULLBOX INSTALLATION**

- A. Assembly and installation shall be per the requirements of the manufacturer.
  - 1. Install manholes and pullboxes level and plumb.
  - 2. Units shall be installed on a 300 mm (12 inches) thick level bed of 90% compacted granular fill, well-graded from the 25 mm (1 inches) sieve to the No. 4 sieve. Granular fill shall be compacted with a minimum of four passes with a plate compactor.
- B. Access: Ensure the top of frames and covers are flush with finished grade.
- C. Grounding in Manholes:

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1. Ground Rods in Manholes: Drive a ground rod into the earth, through the floor sleeve, after the manhole is set in place. Fill the sleeve with sealant to make a watertight seal. Rods shall protrude approximately 100 mm (4 inches) above the manhole floor.
2. Install a No. 3/0 AWG bare copper ring grounding conductor around the inside perimeter of the manhole and anchor to the walls with metallic cable clips.
3. Connect the ring grounding conductor to the ground rod by an exothermic welding process.
4. Bond the ring grounding conductor to the duct bank equipment grounding conductors, the exposed non-current carrying metal parts of racks, sump covers, and like items in the manholes with a minimum No. 6 AWG bare copper jumper using an exothermic welding process.
- D. Sump Pump: Provide 120V cord and plug connected sump pump complete with float switch, thermal overload protection, and GFCI receptacle mounted in NEMA 3R boxes in manhole. Provide dedicated 20 mm (0.75 inch) direct-buried conduit and conductors to nearest electrical panelboard.

**3.2 TRENCHING**

- A. Refer to ~~Section 31~~ 20 11 EARTH MOVING (SHORT FORM)// for trenching, backfilling, and compaction.
- B. Before performing trenching work at existing facilities, a Ground Penetrating Radar Survey shall be carefully performed by a certified technician to reveal all existing underground ducts, conduits, cables, and other utility systems.
- C. Work with extreme care near existing ducts, conduits, and other utilities to avoid damaging them.
- D. Cut the trenches neatly and uniformly.
- E. For Concrete-Encased Ducts:
  1. After excavation of the trench, stakes shall be driven in the bottom of the trench at 1.2 M (4 foot) intervals to establish the grade and route of the duct bank.
  2. Pitch the trenches uniformly toward manholes or both ways from high points between manholes for the required duct line drainage. Avoid pitching the ducts toward buildings wherever possible.
  3. The walls of the trench may be used to form the side walls of the duct bank, provided that the soil is self-supporting and that the

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concrete envelope can be poured without soil inclusions. Forms are required where the soil is not self-supporting.

4. After the concrete-encased duct has sufficiently cured, the trench shall be backfilled to grade with earth, and appropriate warning tape installed.

F. Individual conduits to be installed under existing paved areas and roads that cannot be disturbed shall be jacked into place using rigid metal conduit, or bored using plastic utilities duct or PVC conduit, as approved by the COR.

**3.3 DUCT INSTALLATION**

A. General Requirements:

1. Ducts shall be in accordance with the NEC, as shown on the drawings, and as specified.
2. Join and terminate ducts with fittings recommended by the manufacturer.
3. Slope ducts to drain towards manholes and pullboxes, and away from building and equipment entrances. Pitch not less than 100 mm (4 inch) in 30 M (100 feet).
4. Underground conduit stub-ups and sweeps to equipment inside of buildings shall be galvanized rigid metal conduit half-lap wrapped with PVC tape, and shall extend a minimum of 1.5 M (5 feet) outside the building foundation. Tops of conduits below building slab shall be minimum 610 mm (24 inches) below bottom of slab.
5. Stub-ups and sweeps to equipment mounted on outdoor concrete slabs shall be galvanized rigid metal conduit half-lap wrapped with PVC tape, and shall extend a minimum of 1.5 M (5 feet) away from the edge of slab.
6. Install insulated grounding bushings on the conduit terminations.
7. Radius for sweeps shall be sufficient to accomplish pulls without damage. Minimum radius shall be six times conduit diameter.
8. All multiple conduit runs shall have conduit spacers. Spacers shall securely support and maintain uniform spacing of the duct assembly a minimum of 75 mm (3 inches) above the bottom of the trench during the concrete pour. Spacer spacing shall not exceed 1.5 M (5 feet). Secure spacers to ducts and earth to prevent floating during concrete pour. Provide nonferrous tie wires to prevent displacement

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of the ducts during concrete pour. Tie wires shall not act as substitute for spacers.

9. Duct lines shall be installed no less than 300 mm (12 inches) from other utility systems, such as water, sewer, chilled water.
  10. Clearances between individual ducts:
    - a. For similar services, not less than 75 mm (3 inches).
    - b. For power and signal services, not less than 150 mm (6 inches).
  11. Duct lines shall terminate at window openings in manhole walls as shown on the drawings. All ducts shall be fitted with end bells.
  12. Couple the ducts with proper couplings. Stagger couplings in rows and layers to ensure maximum strength and rigidity of the duct bank.
  13. Keep ducts clean of earth, sand, or gravel, and seal with tapered plugs upon completion of each portion of the work.
  14. Spare Ducts: Where spare ducts are shown, they shall have a nylon pull rope installed. They shall be capped at each end and labeled as to location of the other end.
  15. Duct Identification: Place continuous strip of warning tape approximately 300 mm (12 inches) above ducts before backfilling trenches. Warning tape shall be preprinted with proper identification.
  16. Duct Sealing: Seal ducts, including spare ducts, at building entrances and at outdoor terminations for equipment, with a suitable non-hardening compound to prevent the entrance of foreign objects and material, moisture, and gases.
  17. Use plastic ties to secure cables to insulators on cable arms. Use minimum two ties per cable per insulator.
- B. Concrete-Encased Ducts:
1. Install concrete-encased ducts for medium-voltage systems, low-voltage systems, and signal systems, unless otherwise shown on the drawings.
  2. Duct banks shall be single or multiple duct assemblies encased in concrete. Ducts shall be uniform in size and material throughout the installation.
  3. Tops of concrete-encased ducts shall be:
    - a. Not less than 600 mm (24 inches) and not less than shown on the drawings, below finished grade.

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- b. Not less than 750 mm (30 inches) and not less than shown on the drawings, below roads and other paved surfaces.
- c. Additional burial depth shall be required in order to accomplish NEC-required minimum bend radius of ducts.
- d. Conduits crossing under grade slab construction joints shall be installed a minimum of 1.2 M (4 feet) below slab.
- 4. Extend the concrete envelope encasing the ducts not less than 75 mm (3 inches) beyond the outside walls of the outer ducts.
- 5. Within 3 M (10 feet) of building and manhole wall penetrations, install reinforcing steel bars at the top and bottom of each concrete envelope to provide protection against vertical shearing.
- 6. Install reinforcing steel bars at the top and bottom of each concrete envelope of all ducts underneath roadways and parking areas.
- 7. Where new ducts and concrete envelopes are to be joined to existing manholes, pullboxes, ducts, and concrete envelopes, make the joints with the proper fittings and fabricate the concrete envelopes to ensure smooth durable transitions.
- 8. Duct joints in concrete may be placed side by side horizontally, but shall be staggered at least 150 mm (6 inches) vertically.
- 9. Pour each run of concrete envelope between manholes or other terminations in one continuous pour. If more than one pour is necessary, terminate each pour in a vertical plane and install 19 mm (0.75 inch) reinforcing rod dowels extending 450 mm (18 inches) into concrete on both sides of joint near corners of envelope.
- 10. Pour concrete so that open spaces are uniformly filled. Do not agitate with power equipment unless approved by COR.
- C. Connections to Manholes: Ducts connecting to manholes shall be flared to have an enlarged cross-section to provide additional shear strength. Dimensions of the flared cross-section shall be larger than the corresponding manhole opening dimensions by no less than 300 mm (12 inches) in each direction. Perimeter of the duct bank opening in the manhole shall be flared toward the inside or keyed to provide a positive interlock between the duct and the wall of the manhole. Use vibrators when this portion of the encasement is poured to ensure a seal between the envelope and the wall of the structure.



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- D. Connections to Existing Manholes: For duct connections to existing manholes, break the structure wall out to the dimensions required and preserve the steel in the structure wall. Cut steel and extend into the duct bank envelope. Chip the perimeter surface of the duct bank opening to form a key or flared surface, providing a positive connection with the duct bank envelope.
- E. Connections to Existing Ducts: Where connections to existing ducts are indicated, excavate around the ducts as necessary. Cut off the ducts and remove loose concrete from inside before installing new ducts. Provide a reinforced-concrete collar, poured monolithically with the new ducts, to take the shear at the joint of the duct banks.
- F. Partially-Completed Ducts: During construction, wherever a construction joint is necessary in a duct bank, prevent debris such as mud and dirt from entering ducts by providing suitable plugs. Fit concrete envelope of a partially completed ducts with reinforcing steel extending a minimum of 600 mm (2 feet) back into the envelope and a minimum of 600 mm (2 feet) beyond the end of the envelope. Provide one No. 4 bar in each corner, 75 mm (3 inches) from the edge of the envelope. Secure corner bars with two No. 3 ties, spaced approximately 300 mm (12 inches) apart. Restrain reinforcing assembly from moving during pouring of concrete.

**3.4 ACCEPTANCE CHECKS AND TESTS**

A. Duct Testing and Cleaning:

1. Upon completion of the duct installation, a standard flexible mandrel shall be pulled through each duct to loosen particles of earth, sand, or foreign material left in the duct, and to test for out-of-round conditions.
2. The mandrel shall be not less than 300 mm (12 inches) long, and shall have a diameter not less than 13 mm (0.5 inch) less than the inside diameter of the duct. A brush with stiff bristles shall then be pulled through each duct to remove the loosened particles. The diameter of the brush shall be the same as, or slightly larger than, the diameter of the duct.
3. If testing reveals obstructions or out-of-round conditions, the Contractor shall replace affected section(s) of duct and retest to the satisfaction of the COR at no cost to the Government.

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4. Mandrel pulls shall be witnessed by the COR.

---END---

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**SECTION 26 05 73**  
**OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the overcurrent protective device coordination study, indicated as the study in this section.
- B. A short-circuit and selective coordination study shall be prepared for the electrical overcurrent devices to be installed under this project.
- C. The study shall present a well-coordinated time-current analysis of each overcurrent protective device from the individual device 400ampup to the pad mounted transformer.

**1.2 RELATED WORK**

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.
- B. Section 26 24 13, DISTRIBUTION SWITCHBOARDS: Low-voltage distribution switchboards.
- C. Section 26 24 16, PANELBOARDS: Low-voltage panelboards.
- D. Section 26 36 23, AUTOMATIC TRANSFER SWITCHES: Automatic transfer switches.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. The study shall be prepared by the equipment manufacturer.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Product data on the software program to be used for the study.  
Software shall be in mainstream use in the industry, shall provide device settings and ratings, and shall show selective coordination by time-current drawings.
  - 2. Complete study as described in paragraph 1.6. Submittal of the study shall be well-coordinated with submittals of the shop drawings for equipment in related specification sections.

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3. Certifications: Two weeks prior to final inspection, submit the following.

- a. Certification by the Contractor that the overcurrent protective devices have been set in accordance with the approved study.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. Institute of Electrical and Electronics Engineers (IEEE):
  - 242-01.....Protection and Coordination of Industrial and Commercial Power Systems
  - 399-97.....Industrial and Commercial Power Systems Analysis
  - 1584a-04.....Guide for Performing Arc-Flash Hazard Calculations

**1.6 STUDY REQUIREMENTS**

- A. The study shall include one line diagram, short-circuit and ground fault analysis, and protective coordination plots for all overcurrent protective devices.
- B. One Line Diagram:
  - 1. Show all electrical equipment and wiring to be protected by the overcurrent devices.
  - 2. Show the following specific information:
    - a. Calculated fault impedance, X/R ratios, and short-circuit values at each feeder and branch circuit bus.
    - b. Relay, circuit breaker, and fuse ratings.
    - c. Generator kW/kVA and transformer kVA and voltage ratings, percent impedance, X/R ratios, and wiring connections.
    - d. Voltage at each bus.
    - e. Identification of each bus, matching the identification on the drawings.
    - f. Conduit, conductor, and busway material, size, length, and X/R ratios.
- C. Short-Circuit Study:

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1. The study shall be performed using computer software designed for this purpose. Pertinent data and the rationale employed in developing the calculations shall be described in the introductory remarks of the study.
2. Calculate the fault impedance to determine the available short-circuit and ground fault currents at each bus. Incorporate applicable motor and/or generator contribution in determining the momentary and interrupting ratings of the overcurrent protective devices.
3. Present the results of the short-circuit study in a table. Include the following:
  - a. Device identification.
  - b. Operating voltage.
  - c. Overcurrent protective device type and rating.
  - d. Calculated short-circuit current.

**D. Coordination Curves:**

1. Prepare the coordination curves to determine the required settings of overcurrent protective devices to demonstrate selective coordination. Graphically illustrate on log-log paper that adequate time separation exists between devices, including the utility company upstream device if applicable. Plot the specific time-current characteristics of each overcurrent protective device in such a manner that all devices are clearly depicted.
2. The following specific information shall also be shown on the coordination curves:
  - a. Device identification.
  - b. Potential transformer and current transformer ratios.
  - c. Three-phase and single-phase ANSI damage points or curves for each cable, transformer, or generator.
  - d. Applicable circuit breaker or protective relay characteristic curves.
  - e. No-damage, melting, and clearing curves for fuses.
  - f. Transformer in-rush points.
3. Develop a table to summarize the settings selected for the overcurrent protective devices. Include the following in the table:
  - a. Device identification.

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- b. Protective relay or circuit breaker potential and current transformer ratios, sensor rating, and available and suggested pickup and delay settings for each available trip characteristic.
- c. Fuse rating and type.

**1.7 ANALYSIS**

- A. Analyze the short-circuit calculations, and highlight any equipment determined to be underrated as specified. Propose solutions to effectively protect the underrated equipment.

**1.8 ADJUSTMENTS, SETTINGS, AND MODIFICATIONS**

- A. Final field settings and minor modifications of the overcurrent protective devices shall be made to conform with the study, without additional cost to the Government.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

---END---

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**SECTION 26 08 00**

**COMMISSIONING OF ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. The requirements of this Section apply to all sections of Division 26.
- B. This project will have selected building systems commissioned. The complete list of equipment and systems to be commissioned is specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. The commissioning process, which the Contractor is responsible to execute, is defined in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. A Commissioning Agent (CxA) appointed by the VA will manage the commissioning process.

**1.2 RELATED WORK**

- A. Section 01 00 00 GENERAL REQUIREMENTS.
- B. Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.
- C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

**1.3 SUMMARY**

- A. This Section includes requirements for commissioning the Facility electrical systems, related subsystems and related equipment. This Section supplements the general requirements specified in Section 01 91 00 General Commissioning Requirements.
- B. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for more details regarding processes and procedures as well as roles and responsibilities for all Commissioning Team members.

**1.4 DEFINITIONS**

- A. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for definitions.

**1.5 COMMISSIONED SYSTEMS**

- A. Commissioning of a system or systems specified in Division 26 is part of the construction process. Documentation and testing of these systems, as well as training of the VA's Operation and Maintenance personnel in accordance with the requirements of Section 01 91 00 and of Division 26, is required in cooperation with the VA and the Commissioning Agent.

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- B. The Facility electrical systems commissioning will include the systems listed in Section 01 19 00 General Commissioning Requirements:

**1.6 SUBMITTALS**

- A. The commissioning process requires review of selected Submittals that pertain to the systems to be commissioned. The Commissioning Agent will provide a list of submittals that will be reviewed by the Commissioning Agent. This list will be reviewed and approved by the VA prior to forwarding to the Contractor. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.
- B. The commissioning process requires Submittal review simultaneously with engineering review. Specific submittal requirements related to the commissioning process are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 CONSTRUCTION INSPECTIONS**

- A. Commissioning of Electrical systems will require inspection of individual elements of the electrical systems construction throughout the construction period. The Contractor shall coordinate with the Commissioning Agent in accordance with Section 01 19 00 and the Commissioning plan to schedule electrical systems inspections as required to support the Commissioning Process.

**3.2 PRE-FUNCTIONAL CHECKLISTS**

- A. The Contractor shall complete Pre-Functional Checklists to verify systems, subsystems, and equipment installation is complete and systems are ready for Systems Functional Performance Testing. The Commissioning Agent will prepare Pre-Functional Checklists to be used to document equipment installation. The Contractor shall complete the checklists. Completed checklists shall be submitted to the VA and to the Commissioning Agent for review. The Commissioning Agent may spot check a sample of completed checklists. If the Commissioning Agent determines that the information provided on the checklist is not accurate, the Commissioning Agent will return the marked-up checklist to the Contractor for correction and resubmission. If the



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Commissioning Agent determines that a significant number of completed checklists for similar equipment are not accurate, the Commissioning Agent will select a broader sample of checklists for review. If the Commissioning Agent determines that a significant number of the broader sample of checklists is also inaccurate, all the checklists for the type of equipment will be returned to the Contractor for correction and resubmission. Refer to SECTION 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for submittal requirements for Pre-Functional Checklists, Equipment Startup Reports, and other commissioning documents.

**3.3 CONTRACTORS TESTS**

- A. Contractor tests as required by other sections of Division 26 shall be scheduled and documented in accordance with Section 01 00 00 GENERAL REQUIREMENTS. All testing shall be incorporated into the project schedule. Contractor shall provide no less than 7 calendar days' notice of testing. The Commissioning Agent will witness selected Contractor tests at the sole discretion of the Commissioning Agent. Contractor tests shall be completed prior to scheduling Systems Functional Performance Testing.

**3.4 SYSTEMS FUNCTIONAL PERFORMANCE TESTING**

- A. The Commissioning Process includes Systems Functional Performance Testing that is intended to test systems functional performance under steady state conditions, to test system reaction to changes in operating conditions, and system performance under emergency conditions. The Commissioning Agent will prepare detailed Systems Functional Performance Test procedures for review and approval by the COR. The Contractor shall review and comment on the tests prior to approval. The Contractor shall provide the required labor, materials, and test equipment identified in the test procedure to perform the tests. The Commissioning Agent will witness and document the testing. The Contractor shall sign the test reports to verify tests were performed. See Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS, for additional details.

**3.5 TRAINING OF VA PERSONNEL**

- A. Training of the VA operation and maintenance personnel is required in cooperation with the COR and Commissioning Agent. Provide competent, factory authorized personnel to provide instruction to operation and

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maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. Contractor shall submit training agendas and trainer resumes in accordance with the requirements of Section 01 19 00. The instruction shall be scheduled in coordination with the VA COR after submission and approval of formal training plans. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS and Division 26 Sections for additional Contractor training requirements.

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**SECTION 26 12 19**  
**PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, connection, and testing of the pad-mounted, liquid-filled, medium-voltage transformers, indicated as transformers in this section.

**1.2 RELATED WORK**

- A. Section 03 30 53, CAST-IN-PLACE CONCRETE: Requirements for concrete equipment pads.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- C. Section 26 05 13, MEDIUM-VOLTAGE CABLES: Medium-voltage cables.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground currents.
- E. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Manholes, pull-boxes, and ducts for underground raceway systems.
- F. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Short circuit and coordination study, and requirements for a coordinated electrical system.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 FACTORY TESTS**

- A. Transformers shall be thoroughly tested at the factory to ensure that there are no electrical or mechanical defects. Tests shall be conducted as per IEEE Standards. Factory tests shall be certified. The following tests shall be performed:
1. Perform insulation-resistance tests, winding-to-winding and each winding-to-ground.
  2. Perform turns-ratio tests at all tap positions.
- B. Furnish four (4) copies of certified manufacturer's factory test reports to the COR prior to shipment of the transformers to ensure that the transformers have been successfully tested as specified.

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**1.5 SUBMITTALS**

A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Shop Drawings:

- a. Submit sufficient information to demonstrate compliance with drawings and specifications.
- b. Include electrical ratings, nameplate data, impedance, outline drawing with dimensions and front, top, and side views, weight, mounting details, decibel rating, termination information, temperature rise, no-load and full-load losses, regulation, overcurrent protection, connection diagrams, and accessories.
- c. Complete nameplate data, including manufacturer's name and catalog number.

2. Manuals:

- a. When submitting the shop drawings, submit companion copies of complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.
  - 1) Identify terminals on wiring diagrams to facilitate installation, maintenance, and operation.
  - 2) Indicate on wiring diagrams the internal wiring for each piece of equipment and interconnections between the pieces of equipment.
  - 3) Approvals will be based on complete submissions of manuals, together with shop drawings.
- b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
  - 1) Update the manual to include any information necessitated by shop drawing approval.
  - 2) Show all terminal identification.
  - 3) Include information for testing, repair, troubleshooting, assembly, disassembly, and recommended maintenance intervals.
  - 4) Provide a replacement parts list with current prices. Include a list of recommended spare parts, tools, and instruments for testing and maintenance purposes.

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B. Certifications:

1. Two weeks prior to the final inspection, submit the following certifications.
  - a. Certification by the manufacturer that the transformers conform to the requirements of the drawings and specifications.
  - b. Certification by the Contractor that the transformers have been properly installed, connected, and tested.

**1.6 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American National Standards Institute (ANSI):
- C37.47-00.....High Voltage Current-Limiting Type Distribution  
Class Fuses and Fuse Disconnecting Switches
  - C57.12.00-00.....Liquid-Immersed Distribution, Power and  
Regulating Transformers
  - C57.12.25-90.....Pad-Mounted, Compartmental-Type, Self-Cooled,  
Single-Phase Distribution-Transformers with  
Separable Insulated High Voltage Connectors;  
High Voltage, 34500 Grd Y/19920 Volts and  
Below; Low-Voltage 240/120 Volts; 167 kVA and  
Smaller Requirements
  - C57.12.26-92.....Pad-Mounted, Compartmental-Type, Self-Cooled,  
Three-Phase Distribution Transformers for Use  
with Separable Insulated High-Voltage  
Connectors (34500 Grd Y/19920 V and Below, 2500  
kVA and Smaller)
  - C57.12.28-05.....Pad-Mounted Equipment - Enclosure Integrity
  - C57.12.29-05.....Pad-Mounted Equipment - Enclosure Integrity for  
Coastal Environments
  - C57.12.34-10.....Pad-Mounted, Compartmental-Type, Self-Cooled,  
Three-Phase Distribution Transformers, 5 MVA  
and Smaller; High Voltage, 34.5 kV Nominal  
System Voltage and Below; Low Voltage, 15kV  
Nominal System Voltage and Below

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- C. American Society for Testing and Materials (ASTM):  
D3487-08.....Standard Specification for Mineral Insulating  
Oil Used in Electrical Apparatus
- D. Institute of Electrical and Electronic Engineers (IEEE):  
C2-07.....National Electrical Safety Code  
C57.12.10-11.....Liquid-Immersed Power Transformers  
C57.12.90-10.....Test Code for Liquid-Immersed Distribution,  
Power, and Regulating Transformers  
C62.11-06.....Metal-Oxide Surge Arresters for AC Power  
Circuits  
48-09.....Test Procedures and Requirements for  
Alternating-Current Cable Terminations Used on  
Shielded Cables Having Laminated Insulation  
Rated 2.5kV Through 765kV or Extruded  
Insulation Rated 2.5kV Through 500kV  
386-06.....Separable Insulated Connector Systems for Power  
Distribution Systems Above 600 V  
592-07.....Exposed Semiconducting Shields on High-Voltage  
Cable Joints and Separable Connectors
- E. International Code Council (ICC):  
IBC-12.....International Building Code
- F. National Electrical Manufacturers Association (NEMA):  
LA 1-09.....Surge Arresters  
TP 1-02.....Guide for Determining Energy Efficiency for  
Distribution Transformers  
TR 1-00.....Transformers, Regulators, and Reactors
- G. National Fire Protection Association (NFPA):  
70-11.....National Electrical Code (NEC)
- H. Underwriters Laboratories Inc. (UL):  
467-07.....Grounding and Bonding Equipment

**PART 2 - PRODUCTS**

**2.1 GENERAL REQUIREMENTS**

- A. Transformers shall be in accordance with ANSI, ASTM, IEEE, NEMA, NFPA, UL, as shown on the drawings, and as specified herein. Each transformer shall be assembled as an integral unit by a single manufacturer.

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- B. Transformers shall be complete, outdoor type, continuous duty, integral assembly, grounded, tamper-resistant, and with liquid-immersed windings.
- C. Ratings shall not be less than shown on the drawings.
- D. Completely fabricate transformers at the factory so that only the external cable connections are required at the project site.
- E. Thoroughly clean, phosphatize, and finish all the metal surfaces at the factory with a rust-resistant primer and dark green enamel finish coat, except where a different color is specified in Section 09 06 00, SCHEDULE FOR FINISHES. All surfaces of the transformer that will be in contact with the concrete pad shall be treated with corrosion-resistant compounds and epoxy resin or a rubberized sealing compound.

**2.2 COMPARTMENTS**

**A. Construction:**

- 1. Enclosures shall be weatherproof and in accordance with //ANSI C57.12.282. The medium- and low-voltage compartments shall be separated with a steel barrier that extends the full height and depth of the compartments.
- 3. The compartments shall be constructed of sheet steel (gauge to meet ANSI requirements) with bracing and with reinforcing gussets using jig welds to assure rectangular rigidity.
- 4. All bolts, nuts, and washers shall be cadmium-plated steel.
- 5. Sufficient space shall be provided for equipment, cabling, and terminations within the compartments.
- 6. Affix transformer nameplate permanently within the low-voltage compartment. Voltage and kVA rating, connection configuration, impedance, date of manufacture, and serial number shall be shown on the nameplate.

**B. Doors:**

- 1. Provide a separate door for each compartment with provisions for a single padlock to secure all doors. Provide each compartment door with open-position doorstops and corrosion-resistant tamperproof hinges welded in place. The medium-voltage compartment door shall be mechanically prevented from opening unless the low-voltage compartment door is open.

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2. The secondary compartment door shall have a one-piece steel handle and incorporate three-point locking mechanisms.
3. Provide a 50 mm (2 inches) size padlock for each assembly, as approved by the COR. Padlocks shall be keyed to the COR's established key set. Firmly attach the padlock to the door assembly by a chain.

**2.3 BIL RATING**

- A. 5 kV class equipment shall have a minimum 60 kV BIL rating.

**2.4 TRANSFORMER FUSE ASSEMBLY**

- A. The primary fuse assembly shall be load-break combination fuse and dry-well fuse holder rated for system voltage, rated for 10 load makes and 10 load breaks, with rated 200 amp load current at 75% power factor, 10,000 symmetrical A close-in on fault duty, and 95 kV BIL. The entire fuse assembly shall be removable through the use of hot stick.
  1. The fuses shall be concealed, hot stick removable, 50,000 A symmetrical interrupting, non-expulsion, current-limiting primary distribution type, of the size and voltage class as shown on the drawings. The fuses shall operate within the fuse holder as a unit disconnecting means. Fuses shall be in accordance with ANSI C37.47.
  2. Transformers shall not have internal "weak link" fuses that require transformer tank cover removal for replacement.
  3. For units above 500 kVA using fusing above the 50 A 15 kV and 100 A 5 kV application, a clip-mounted arrangement of the current limiting fuses (i.e., live-front configuration) is required.++

**2.5 PRIMARY CONNECTIONS**

- A. Primary connections shall be live-front bushings with NEMA spades or eyebolt terminals suitable for cable sizes shown on the drawings.++

**2.6 MEDIUM-VOLTAGE TERMINATIONS**

- A. Terminate the medium-voltage cables in the primary compartment with 600 A deadbreak premolded rubber elbow connectors, suitable for submersible applications. Elbow connectors shall have a semi-conductive shield material covering the housing. The separable connector system shall include the loadbreak elbow, the bushing insert, and the bushing well. Separable connectors shall comply with the requirements of IEEE 386, and shall be interchangeable between suppliers. Allow sufficient slack



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in medium-voltage cable, ground, and drain wires to permit elbow connectors to be moved to their respective parking stands.

- B. Ground metallic cable shield with a cable shield grounding adapter, consisting of a solderless connector enclosed in watertight rubber housing covering the entire assembly, bleeder wire, and ground braid.

## **2.7 LOW-VOLTAGE EQUIPMENT**

- A. Mount the low-voltage bushings, and hot stick in the low-voltage compartment.
- B. The low-voltage leads shall be brought out of the tank by epoxy pressure tight bushings, and shall be standard arrangement.
- C. Tin-plate the low-voltage neutral terminal and isolate from the transformer tank. Provide a removable ground strap sized in accordance with the NEC and connect between the secondary neutral and ground pad.

## **2.8 TRANSFORMERS**

- A. Transformer ratings shall be as shown on drawings. kVA ratings shown on the drawings are for continuous duty without the use of cooling fans.
- B. Temperature rises shall not exceed the NEMA TR 1 standards of 65° C (149° F) by resistance.
- C. Transformer insulating material shall be less flammable, edible-seed-oil based, and UL listed as complying with NFPA 70 requirements for fire point of not less than 300° C (600° F) when tested according to ASTM D 92. Liquid shall be biodegradable and nontoxic.
- D. Transformer impedance shall be not less than 4-1/2% for sizes 150 kVA and larger. Impedance shall be as shown on the drawings.
- E. Sound levels shall conform to NEMA TR 1 standards.
- F. Primary and Secondary Windings for Three-Phase Transformers:
  - 1. Primary windings shall be delta-connected.
  - 2. Secondary windings shall be wye-connected, except where otherwise indicated on the drawings. Provide isolated neutral bushings for secondary wye-connected transformers.
  - 3. Secondary leads shall be brought out through pressure-tight epoxy bushings.
- G. Primary windings shall have four 2-1/2% full-capacity voltage taps; two taps above and two taps below rated voltage.
- H. Core and Coil Assemblies:

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1. Cores shall be grain-oriented, non-aging, silicon steel to minimize losses.
2. Core and coil assemblies shall be rigidly braced to withstand the stresses caused by rough handling during shipment, and stresses caused by any possible short-circuit currents.
3. Coils shall be continuous-winding type without splices except for taps. Material shall be copper.
4. Coil and core losses shall be optimum for efficient operation.
5. Primary, secondary, and tap connections shall be brazed or pressure type.
6. Provide end fillers or tiedowns for coil windings.
- I. The transformer tank, cover, and radiator gauge thickness shall not be less than that required by ANSI.
- J. Accessories:
  1. Provide standard NEMA features, accessories, and the following:
    - a. No-load tap changer. Provide warning sign.
    - b. Lifting, pulling, and jacking facilities.
    - c. Globe-type valve for oil filtering and draining, including sampling device.
    - d. Pressure relief valve.
    - e. Liquid level gauge and filling plug.
    - f. A grounding pad in the medium- and low-voltage compartments.
    - g. A diagrammatic nameplate.
    - h. Dial-type liquid thermometer with a maximum reading pointer and an external reset.
    - i. Hot stick. Securely fasten hot stick within low-voltage compartment.
  2. The accessories shall be made accessible within the compartments without disassembling trims and covers.
- K. Transformers shall meet the minimum energy efficiency values per NEMA TP 1:

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KVA	(%)
75	98.7
112.5	98.8
150	98.9
225	99.0
300	99.0
500	99.1
750	99.2
1000	99.2
1500	99.3
2000	99.4
2500	99.4

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install transformers outdoors, as shown on the drawings, in accordance with the NEC, and as recommended by the manufacturer.
- B. Anchor transformers with rustproof bolts, nuts, and washers not less than 12 mm (1/2 inch) diameter, in accordance with manufacturer's instructions, and as shown on drawings.
- C. Mount transformers on concrete slab. Unless otherwise indicated, the slab shall be at least 200 mm (8 inches) thick, reinforced with a 150 by 150 mm (6 by 6 inches) No. 6 mesh placed uniformly 100 mm (4 inches) from the top of the slab. Slab shall be placed on a 150 mm (6 inches) thick, well-compacted gravel base. The top of the concrete slab shall be approximately 100 mm (4 inches) above the finished grade. Edges above grade shall have 12-1/2 mm (1/2 inch) chamfer. The slab shall be of adequate size to project at least 200 mm (8 inches) beyond the equipment. Provide conduit turnups and cable entrance space required by the equipment to be mounted. Seal voids around conduit openings in slab with water- and oil-resistant caulking or sealant. Cut off and bush conduits 75 mm (3 inches) above slab surface. Concrete work shall be as specified in Section 03 30 53, CAST-IN-PLACE CONCRETE.
- D. Grounding:

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1. Ground each transformer in accordance with the requirements of the NEC. Install ground rods per the requirements of Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS, to maintain a maximum resistance of 5 ohms to ground.
2. Connect the ground rod to the ground pads in the medium- and low-voltage compartments.
3. Install and connect the cable shield grounding adapter per the manufacturer's instructions. Connect the bleeder wire of the cable shield grounding adapter to the loadbreak or deadbreak elbow grounding point with minimum No. 14 AWG wire, and connect the ground braid to the grounding system with minimum No. 6 AWG bare copper wire. Use soldered or mechanical grounding connectors listed for this purpose.

**3.2 ACCEPTANCE CHECKS AND TESTS**

- A. Perform manufacturer's required field tests in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:
  - a. Compare equipment nameplate data with specifications and approved shop drawings.
  - b. Inspect physical and mechanical condition. Check for damaged or cracked bushings and liquid leaks.
  - c. Verify that control and alarm settings on temperature indicators are as specified.
  - d. Inspect all field-installed bolted electrical connections, using the calibrated torque-wrench method to verify tightness of accessible bolted electrical connections, and perform thermographic survey after energization under load.
  - e. Vacuum-clean transformer interior. Clean transformer enclosure exterior.
  - f. Verify correct liquid level in transformer tank.
  - g. Verify correct equipment grounding per the requirements of Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
  - h. Verify the presence and connection of transformer surge arresters, if provided.
  - i. Verify that the tap-changer is set at rated system voltage.

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**3.3 FOLLOW-UP VERIFICATION**

- A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the transformers are in good operating condition and properly performing the intended function.

**3.4 SPARE PARTS**

- A. Deliver the following spare parts for the project to the COR two weeks prior to final inspection:
1. Six insulated protective caps.
  2. One spare set of medium-voltage fuses for each size and type of fuse used in the project.

**3.5 INSTRUCTION**

- A. The Contractor shall instruct maintenance personnel, for not less than one 2-hour period, on the maintenance and operation of the equipment on the date requested by the COR.

---END---

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**SECTION 26 22 00**  
**LOW-VOLTAGE TRANSFORMERS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, connection, and testing of low-voltage dry-type general-purpose transformers, indicated as transformers in this section.

**1.2 RELATED WORK**

- A. Section 03 30 53, CAST-IN-PLACE CONCRETE: Requirements for concrete equipment pads.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- C. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- E. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - b. Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, temperature rise, wiring and connection diagrams, plan, front, side, and rear elevations, accessories, and device nameplate data.
  - 2. Manuals:
    - a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets and wiring diagrams.

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- 1) Schematic signal and control diagrams, with all terminals identified, matching terminal identification in the transformers.
- 2) Include information for testing, repair, troubleshooting, assembly, disassembly, and factory recommended/required periodic maintenance procedures and frequency.
- b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
3. Certifications: Two weeks prior to final inspection, submit the following.
  - a. Certification by the manufacturer that the transformers conform to the requirements of the drawings and specifications.
  - b. Certification by the Contractor that the transformers have been properly installed, adjusted, and tested.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. International Code Council (ICC):  
IBC-12.....International Building Code
- C. National Fire Protection Association (NFPA):  
70-11.....National Electrical Code (NEC)
- D. National Electrical Manufacturers Association (NEMA):  
TP1-02.....Guide for Determining Energy Efficiency for  
Distribution Transformers  
TR1-00.....Transformers, Regulators, and Reactors
- E. Underwriters Laboratories, Inc. (UL):  
UL 506-08.....Standard for Specialty Transformers  
UL 1561-11.....Dry-Type General Purpose and Power Transformers
- F. United States Department of Energy  
10 CFR Part 431.....Energy Efficiency Program for Certain  
Commercial and Industrial Equipment

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**PART 2 - PRODUCTS**

**2.1 TRANSFORMERS**

- A. Unless otherwise specified, transformers shall be in accordance with NEMA, NEC, UL and as shown on the drawings.
- B. Transformers shall have the following features:
  - 1. Self-cooled by natural convection, isolating windings, indoor dry-type. Autotransformers will not be accepted, except as specifically allowed for buck-boost applications.
  - 2. Rating and winding connections shall be as shown on the drawings.
  - 3. Ratings shown on the drawings are for continuous duty without the use of cooling fans.
  - 4. Copper windings.
  - 5. Insulation systems:
    - a. Transformers 30 kVA and larger: UL rated 220 °C (428 °F) system with an average maximum rise by resistance of 150 °C (302 °F) in a maximum ambient of 40 °C (104 °F).
    - b. Transformers below 30 kVA: Same as for 30 kVA and larger or UL rated 185 °C (365 °F) system with an average maximum rise by resistance of 115 °C (239 °F) in a maximum ambient of 40 °C (104 °F).
  - 6. Core and coil assemblies:
    - a. Rigidly braced to withstand the stresses caused by short-circuit currents and rough handling during shipment.
    - b. Cores shall be grain-oriented, non-aging, and silicon steel.
    - c. Coils shall be continuous windings without splices except for taps.
    - d. Coil loss and core loss shall be minimized for efficient operation.
    - e. Primary and secondary tap connections shall be brazed or pressure type.
    - f. Coil windings shall have end filters or tie-downs for maximum strength.
  - 7. Certified sound levels, determined in accordance with NEMA, shall not exceed the following:



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Transformer Rating	Sound Level Rating
0 - 9 KVA	40 dB
10 - 50 KVA	45 dB
51 - 150 KVA	50 dB
151 - 300 KVA	55 dB
301 - 500 KVA	60 dB

8. If not shown on drawings, nominal impedance shall be as permitted by NEMA.
9. Single phase transformers rated 15 kVA through 25 kVA shall have two 5% full capacity taps below normal rated primary voltage. All transformers rated 30 kVA and larger shall have two 2.5% full capacity taps above, and four 2.5% full capacity taps below normal rated primary voltage.
10. Core assemblies shall be grounded to their enclosures with adequate flexible ground straps.
11. Enclosures:
  - a. Comprised of not less than code gauge steel.
  - b. Outdoor enclosures shall be NEMA 3R.
  - c. Temperature rise at hottest spot shall conform to NEMA Standards, and shall not bake and peel off the enclosure paint after the transformer has been placed in service.
  - d. Ventilation openings shall prevent accidental access to live components.
  - e. The enclosure at the factory shall be thoroughly cleaned and painted with manufacturer's prime coat and standard finish.
12. Standard NEMA features and accessories, including ground pad, lifting provisions, and nameplate with the wiring diagram and sound level indicated.
13. Dimensions and configurations shall conform to the spaces designated for their installations.
14. Transformers shall meet the minimum energy efficiency values per NEMA TP1 as listed below:

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kVA Rating	Output efficiency (%)
15	97
30	97.5
45	97.7
75	98
112.5	98.2
150	98.3
225	98.5
300	98.6
500	98.7
750	98.8

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Installation of transformers shall be in accordance with the NEC, as recommended by the equipment manufacturer and as shown on the drawings.
- B. Anchor transformers with rustproof bolts, nuts, and washers, in accordance with manufacturer's instructions, and as shown on drawings.
- C. Install transformers with manufacturer's recommended clearance from wall and adjacent equipment for air circulation. Minimum clearance shall be 150 mm (6 inches).
- D. Install transformers on vibration pads designed to suppress transformer noise and vibrations.

**3.2 ACCEPTANCE CHECKS AND TESTS**

- A. Perform tests in accordance with the manufacturer's recommendations.  
In addition, include the following:
  - 1. Visual Inspection and Tests:
    - a. Compare equipment nameplate data with specifications and approved shop drawings.
    - b. Inspect physical and mechanical condition.
    - c. Inspect all field-installed bolted electrical connections, using the calibrated torque-wrench method to verify tightness of accessible bolted electrical connections.

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- d. Perform specific inspections and mechanical tests as recommended by manufacturer.
- e. Verify correct equipment grounding.
- f. Verify proper secondary phase-to-phase and phase-to-neutral voltage after energization and prior to connection to loads.

**3.3 FOLLOW-UP VERIFICATION**

- A. Upon completion of acceptance checks, settings, and tests, the contractor shall demonstrate that the transformers are in good operating condition, and properly performing the intended function.

---END---

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**SECTION 26 24 13**  
**DISTRIBUTION SWITCHBOARDS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, connection, and testing of the low-voltage circuit-breaker distribution switchboards, indicated as switchboard(s) in this section.

**1.2 RELATED WORK**

- A. Section 03 30 53, CAST-IN-PLACE CONCRETE: Requirements for concrete equipment pads
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- C. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible fault currents.
- E. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit.
- F. Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY: Short circuit and coordination study, and requirements for a coordinated electrical system.
- G. Section 26 43 13, SURGE PROTECTIVE DEVICES: Surge protective devices for switchboards.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 FACTORY TESTS**

- A. Switchboards shall be thoroughly tested at the factory to assure that there are no electrical or mechanical defects. Tests shall be conducted as per NEMA PB 2. Factory tests shall be certified.
- B. The following additional tests shall be performed:
1. Verify that circuit breaker sizes and types correspond to drawings, and the Overcurrent Protective Device Coordination Study.
  2. Verify tightness of bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data.

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4. Exercise all active components.
  5. Perform an insulation-resistance test, phase to ground, on each bus section, with phases not under test grounded, in accordance with manufacturer's published data.
  6. Perform insulation-resistance tests on control wiring with respect to ground. Applied potential shall be 500 V DC for 300-volt rated cable and 1000 V DC for 600-volt rated cable, or as required if solid-state components or control devices cannot tolerate the applied voltage.
  7. If applicable, verify correct function of control transfer relays located in the switchboard with multiple control power sources.
  8. Perform phasing checks on double-ended or dual-source switchboards to insure correct bus phasing from each source.
- C. Furnish four (4) copies of certified manufacturer's factory test reports prior to shipment of the switchboards to ensure that the switchboards have been successfully tested as specified.
- D. The Government shall have an option to witness the factory tests. All expenses of the Government Representative's trips to witness the testing will be paid by the Government. Notify the COR not less than 30 days prior to making tests at the factory.

**1.5 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
1. Shop Drawings:
    - a. Switchboard shop drawings shall be submitted simultaneously with or after the Overcurrent Protective Device Coordination Study.
    - b. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - c. Prior to fabrication of switchboards, submit the following data for approval:
      - 1) Complete electrical ratings.
      - 2) Circuit breaker sizes.
      - 3) Interrupting ratings.
      - 4) Safety features.
      - 5) Accessories and nameplate data.

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- 6) Switchboard one line diagram, showing ampere rating, number of bars per phase and neutral in each bus run (horizontal and vertical), bus spacing, equipment ground bus, and bus material.
  - 7) Elementary and interconnection wiring diagrams.
  - 8) Technical data for each component.
  - 9) Dimensioned exterior views of the switchboard.
  - 10) Dimensioned section views of the switchboard.
  - 11) Floor plan of the switchboard.
  - 12) Foundation plan for the switchboard.
  - 13) Provisions and required locations for external conduit and wiring entrances.
  - 14) Approximate design weights.
2. Manuals:
- a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.
    - 1) Schematic signal and control diagrams, with all terminals identified, matching terminal identification in the switchboard.
    - 2) Include information for testing, repair, trouble shooting, assembly, disassembly, and factory recommended/required periodic maintenance procedures and frequency.
    - 3) Provide a replacement and spare parts list. Include a list of tools and instruments for testing and maintenance purposes.
  - b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
3. Certifications: Two weeks prior to final inspection, submit the following.
- a. Certification by the manufacturer that the switchboards conform to the requirements of the drawings and specifications.
  - b. Certification by the Contractor that the switchboards have been properly installed, adjusted, and tested.

**1.6 APPLICABLE PUBLICATIONS**

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- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. Institute of Engineering and Electronic Engineers (IEEE):
- C37.13-08.....Low Voltage AC Power Circuit Breakers Used in Enclosures
  - C57.13-08.....Instrument Transformers
  - C62.41.1-03.....Surge Environment in Low-voltage (1000V and less) AC Power Circuits
  - C62.45-92.....Surge Testing for Equipment connected to Low-Voltage AC Power Circuits
- C. International Code Council (ICC):
- IBC-12.....International Building Code
- D. National Electrical Manufacturer's Association (NEMA):
- PB-2-06.....Deadfront Distribution Switchboards
  - PB-2.1-07.....Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less
- E. National Fire Protection Association (NFPA):
- 70-11.....National Electrical Code (NEC)
- F. Underwriters Laboratories, Inc. (UL):
- 67-09.....Panelboards
  - 489-09.....Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
  - 891-05.....Switchboards

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. Shall be in accordance with ANSI, IEEE, NEMA, NFPA, UL, as shown on the drawings, and have the following features:
1. Switchboard shall be a complete, grounded, continuous-duty, integral assembly, dead-front, dead-rear, self-supporting, indoor type switchboard assembly. Incorporate devices shown on the drawings and all related components required to fulfill operational and functional requirements.

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2. Ratings shall not be less than shown on the drawings. Short circuit ratings shall not be less than the available fault current shown in the Overcurrent Protective Device Coordination Study.
3. Switchboard shall conform to the arrangements and details shown on the drawings.
6. Switchboards shall be assembled, connected, and wired at the factory so that only external circuit connections are required at the construction site. Split the structure only as required for shipping and installation. Packaging shall provide adequate protection against rough handling during shipment.
7. All non-current-carrying parts shall be grounded per Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS for additional requirements.
8. Series rated switchboards are not allowed.

**2.2 BASIC ARRANGEMENT**

- A. Type 1: Switchboard shall be front accessible with the following features:
  1. Device mounting:
    - a. Main breaker: Individually mounted and compartmented or group mounted with feeder breakers.
    - b. Feeder breakers: Group mounted.
  2. Section alignment: As shown on the drawings.
  3. Accessibility:
    - a. Main section line and load terminals: Front and side.
    - b. Distribution section line and load terminals: Front.
    - c. Through bus connections: Front and end.
  4. Bolted line and load connections.
  5. Full height wiring gutter covers for access to wiring terminals.

**2.3 HOUSING**

- A. Shall have the following features:
  1. Frames and enclosures:
    - a. The assembly shall be braced with reinforcing gussets using jig welds to assure rectangular rigidity.
    - b. The enclosure shall be steel, leveled, and not less than the gauge required by applicable publications.



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c. Die-pierce the holes for connecting adjacent structures to insure proper alignment, and to allow for future additions.

d. All bolts, nuts, and washers shall be cadmium-plated steel.

**B. Finish:**

1. All metal surfaces shall be thoroughly cleaned, phosphatized and factory primed prior to applying baked enamel or lacquer finish.

2. Provide a light gray finish for indoor switchboard.

**2.4 BUSES**

**A. Bus Bars and Interconnections:**

1. Provide copper phase and neutral buses, fully rated for the amperage as shown on the drawings for the entire length of the switchboard.

Bus laminations shall have a minimum of 6 mm (1/4 inch) spacing.

2. Mount the buses on appropriately spaced insulators and brace to withstand the available short circuit currents.

3. The bus and bus compartment shall be designed so that the acceptable NEMA standard temperature rises are not exceeded.

4. Install a copper ground bus the full length of the switchboard assembly.

5. Main Bonding Jumper: An un-insulated copper bus, size as shown on drawings, shall interconnect the neutral and ground buses, when the switchboard is used to establish the system common ground point.

6. All bolts, nuts, and washers shall be cadmium-plated steel. Bolts shall be torqued to the values recommended by the manufacturer.

7. Make provisions for future bus extensions by means of bolt holes or other approved method.

**2.5 MAIN CIRCUIT BREAKERS**

**A. Type I or Type II Switchboards:** Provide molded case main circuit breakers as shown on the drawings. Circuit breakers shall be the solid state adjustable trip type.

1. Trip units shall have field adjustable tripping characteristics as follows:

a. Long time pickup.

b. Long time delay.

c. Short time pickup.

d. Short time delay.

e. Instantaneous.

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- f. Ground fault pickup.
- g. Ground fault delay.
- 2. Breakers with same frame size shall be interchangeable with each other.
- 3. Breakers shall be fully rated.

**2.6 FEEDER CIRCUIT BREAKERS**

- A. Provide molded case circuit breakers as shown on the drawings.
- B. Adjustable Trip Molded Case Circuit Breakers:
  - 1. Provide molded case, solid state adjustable trip type circuit breakers.
  - 2. Trip units shall have field adjustable tripping characteristics as follows:
    - a. Long time pickup.
    - b. Long time delay.
    - c. Short time pickup.
    - d. Short time delay.
    - e. Instantaneous.
    - f. Ground fault pickup.
    - g. Ground fault delay.
  - 3. Breakers with same frame size shall be interchangeable with each other.

**2.7 SURGE PROTECTIVE DEVICES**

- A. Refer to Section 26 43 13, SURGE PROTECTIVE DEVICES.

**2.8 OTHER EQUIPMENT**

- A. Furnish tools and accessories required for circuit breaker and switchboard test, inspection, maintenance, and proper operation.
- B. Panelboards: Requirements for panelboards shown to be installed in the switchboard shall be as shown on the drawings and in Section 26 24 16, PANELBOARDS.

**2.9 CONTROL WIRING**

- A. Switchboard control wires shall not be less than No. 14 AWG copper 600 volt rated. Install wiring complete at the factory, adequately bundled and protected. Provide separate control circuit fuses in each breaker compartment and locate for ease of access and maintenance.

**2.10 NAMEPLATES AND MIMIC BUS**

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- A. Nameplates: For Normal Power system, provide laminated black phenolic resin with white core with 12 mm (1/2 inch) engraved lettered nameplates next to each circuit breaker. For Essential Electrical System, provide laminated red phenolic resin with white core with 12 mm (1/2 inch) engraved lettered nameplates next to each circuit breaker. Nameplates shall indicate equipment served, spaces, or spares in accordance with one line diagram shown on drawings. Nameplates shall be mounted with plated screws on front of breakers or on equipment enclosure next to breakers. Mounting nameplates only with adhesive is not acceptable.
- B. Mimic Bus: Provide an approved mimic bus on front of each switchboard assembly. Color shall be black for the Normal Power system and red for the Essential Electrical System, either factory-painted plastic or metal strips. Plastic tape shall not be used. Use symbols similar to one line diagram shown on drawings. Plastic or metal strips shall be mounted with plated screws.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install switchboards in accordance with the NEC, as shown on the drawings, and as recommended by the manufacturer.
- B. Anchor switchboards with rustproof bolts, nuts, and washers not less than 13 mm (1/2 inch) diameter, in accordance with manufacturer's instructions, and as shown on drawings.
- C. Exterior Location. Mount switchboard on concrete slab. Unless otherwise indicated, the slab shall be at least 200 mm (8 inches) thick, reinforced with a 150 by 150 mm (6 by 6 inches) No. 6 mesh placed uniformly 100 mm (4 inches) from the top of the slab. Slab shall be placed on a 150 mm (6 inches) thick, well-compacted gravel base. The top of the concrete slab shall be approximately 100 mm (4 inches) above the finished grade. Edges above grade shall have 12.5 mm (1/2 inch) chamfer. The slab shall be of adequate size to project at least 200 mm (8 inches) beyond the equipment. Provide conduit turnups and cable entrance space required by the equipment to be mounted. Seal voids around conduit openings in slab with water- and oil-resistant caulking or sealant. Cut off and bush conduits 75 mm (3 inches) above slab

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surface. Concrete work shall be as specified in Section 03 30 53, CAST-IN-PLACE CONCRETE.

- D. Interior Location. Mount switchboard on concrete slab. Unless otherwise indicated, the slab shall be at least 100 mm (4 inches) thick. The top of the concrete slab shall be approximately 100 mm (4 inches) above finished floor. Edges above floor shall have 12.5 mm (1/2 inch) chamfer. The slab shall be of adequate size to project at least 200 mm (8 inches) beyond the equipment. Provide conduit turnups and cable entrance space required by the equipment to be mounted. Seal voids around conduit openings in slab with water- and oil-resistant caulking or sealant. Cut off and bush conduits 75 mm (3 inches) above slab surface. Concrete work shall be as specified in Section 03 30 53, CAST-IN-PLACE CONCRETE.

**3.2 ACCEPTANCE CHECKS AND TESTS**

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
1. Visual Inspection and Tests:
    - a. Compare equipment nameplate data with specifications and approved shop drawings.
    - b. Inspect physical, electrical, and mechanical condition.
    - c. Verify appropriate anchorage, required area clearances, and correct alignment.
    - d. Verify that circuit breaker sizes and types correspond to approved shop drawings.
    - e. Verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method, or performing thermographic survey after energization.
    - f. Vacuum-clean switchboard enclosure interior. Clean switchboard enclosure exterior.
    - g. Inspect insulators for evidence of physical damage or contaminated surfaces.
    - h. Verify correct shutter installation and operation.
    - i. Exercise all active components.
    - j. Verify the correct operation of all sensing devices, alarms, and indicating devices.
    - k. Verify that vents are clear.

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2. Electrical tests:

- a. Perform insulation-resistance tests on each bus section.
- b. Perform insulation-resistance test on control wiring; do not perform this test on wiring connected to solid-state components.
- c. Perform phasing check on double-ended switchboards to ensure correct bus phasing from each source.

**3.3 FOLLOW-UP VERIFICATION**

- A. Upon completion of acceptance checks, settings, and tests, the Contractor shall show by demonstration in service that the switchboard is in good operating condition and properly performing the intended function.

**3.4 WARNING SIGN**

- A. Mount on each entrance door of the switchboard room, approximately 1500 mm (5 feet) above grade or floor, a clearly lettered warning sign for warning personnel. The sign shall be attached with rustproof metal screws.

**3.5 ONE LINE DIAGRAM AND SEQUENCE OF OPERATION**

- A. At final inspection, an as-built one line diagram shall be laminated or mounted under acrylic glass, and installed in a frame mounted in the switchboard room or in the outdoor switchboard enclosure.
- C. Deliver an additional four copies of the as-built one line diagram to the COR.

**3.6 AS-LEFT TRIP UNIT SETTINGS**

- A. The trip unit settings shall be set in the field by an authorized representative of the switchboard manufacturer per the approved Electrical System Protective Device Study in accordance with Section 26 05 73, OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY.
- B. The trip unit settings of the main breaker(s) shall be reviewed by the electric utility company to assure coordination with the electric utility company primary fusing. Prior to switchboard activation, provide written verification of this review to the COR.
- C. Post a durable copy of the "as-left" trip unit settings in a convenient location in the outdoor switchboard enclosure. Deliver four additional copies of the settings to the COR. Furnish this information prior to the activation of the switchboard.

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**3.7 INSTRUCTION**

- A. Furnish the services of a factory-trained technician for one, 4-hour training period for instructing personnel in the maintenance and operation of the switchboards, on the dates requested by the COR.

---END---

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**SECTION 26 24 16**  
**PANELBOARDS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, and connection of panelboards.

**1.2 RELATED WORK**

- A. Section 09 91 00, PAINTING: Painting of panelboards.
- C. Section 25 10 10, ADVANCED UTILITY METERING: Requirements for electrical metering.
- D. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- E. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.
- F. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- G. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.
- I. Section 26 09 23, LIGHTING CONTROLS: Lighting controls integral to panelboards.
- J. Section 26 43 13, SURGE PROTECTIVE DEVICES: Surge protective devices integral to panelboards.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - b. Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, circuit breakers, wiring and connection diagrams, accessories, and nameplate data.

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2. Manuals:
  - a. Submit, simultaneously with the shop drawings, complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering circuit breakers and replacement parts.
    - 1) Include schematic diagrams, with all terminals identified, matching terminal identification in the panelboards.
    - 2) Include information for testing, repair, troubleshooting, assembly, and disassembly.
  - b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
3. Certifications: Two weeks prior to final inspection, submit the following.
  - a. Certification by the manufacturer that the panelboards conform to the requirements of the drawings and specifications.
  - b. Certification by the Contractor that the panelboards have been properly installed, adjusted, and tested.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. International Code Council (ICC):  
IBC-12.....International Building Code
- C. National Electrical Manufacturers Association (NEMA):  
PB 1-11.....Panelboards  
250-08.....Enclosures for Electrical Equipment (1,000V  
Maximum)
- D. National Fire Protection Association (NFPA):  
70-11.....National Electrical Code (NEC)  
70E-12.....Standard for Electrical Safety in the Workplace
- E. Underwriters Laboratories, Inc. (UL):  
50-95.....Enclosures for Electrical Equipment  
67-09.....Panelboards



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489-09.....Molded Case Circuit Breakers and Circuit  
Breaker Enclosures

**PART 2 - PRODUCTS**

**2.1 GENERAL REQUIREMENTS**

- A. Panelboards shall be in accordance with NEC, NEMA, UL, as specified, and as shown on the drawings.
- B. Panelboards shall have main breaker or main lugs, bus size, voltage, phases, number of circuit breaker mounting spaces, top or bottom feed, flush or surface mounting, branch circuit breakers, and accessories as shown on the drawings.
- C. Panelboards shall be completely factory-assembled with molded case circuit breakers and integral accessories as shown on the drawings or specified herein.
- D. Non-reduced size copper bus bars, rigidly supported on molded insulators, and fabricated for bolt-on type circuit breakers.
- E. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type.
- F. Mechanical lugs furnished with panelboards shall be cast, stamped, or machined metal alloys listed for use with the conductors to which they will be connected.
- G. Neutral bus shall be 100% rated, mounted on insulated supports.
- H. Grounding bus bar shall be equipped with screws or lugs for the connection of equipment grounding conductors.
- I. Bus bars shall be braced for the available short-circuit current as shown on the drawings, but not be less than 10,000 A symmetrical for 120/208 V and 120/240 V panelboards, and 14,000 A symmetrical for 277/480 V panelboards.
- J. In two-section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side of main lugs only, or through-feed lugs for main breaker type panelboards, and have field-installed cable connections to the second section as shown on the drawings. Panelboard sections with tapped bus or crossover bus are not acceptable.
- K. Series-rated panelboards are not permitted.

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**2.2 ENCLOSURES AND TRIMS**

A. Enclosures:

1. Provide galvanized steel enclosures, with NEMA rating as shown on the drawings or as required for the environmental conditions in which installed.
2. Enclosures shall not have ventilating openings.
3. Enclosures may be of one-piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
4. Provide manufacturer's standard option for prepunched knockouts on top and bottom endwalls.
5. Include removable inner dead front cover, independent of the panelboard cover.

B. Trims:

1. Hinged "door-in-door" type.
2. Interior hinged door with hand-operated latch or latches, as required to provide access only to circuit breaker operating handles, not to energized parts.
3. Outer hinged door shall be securely mounted to the panelboard enclosure with factory bolts, screws, clips, or other fasteners, requiring a key or tool for entry. Hand-operated latches are not acceptable.
4. Inner and outer doors shall open left to right.
5. Trims shall be flush or surface type as shown on the drawings.

**2.3 MOLDED CASE CIRCUIT BREAKERS**

- A. Circuit breakers shall be per UL, NEC, as shown on the drawings, and as specified.
- B. Circuit breakers shall be bolt-on type.
- C. Circuit breakers shall have minimum interrupting rating as required to withstand the available fault current, but not less than:
1. 120/208 V Panelboard: 10,000 A symmetrical.
  2. 120/240 V Panelboard: 10,000 A symmetrical.
  3. 277/480 V Panelboard: 14,000 A symmetrical.
- D. Circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for less than 400 A

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frame. Circuit breakers with 400 A frames and above shall have magnetic trip, adjustable from 5x to 10x.

E. Circuit breaker features shall be as follows:

1. A rugged, integral housing of molded insulating material.
2. Silver alloy contacts.
3. Arc quenchers and phase barriers for each pole.
4. Quick-make, quick-break, operating mechanisms.
5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
6. Electrically and mechanically trip free.
7. An operating handle which indicates closed, tripped, and open positions.
8. An overload on one pole of a multi-pole breaker shall automatically cause all the poles of the breaker to open.
9. Ground fault current interrupting breakers, shunt trip breakers, lighting control breakers (including accessories to switch line currents), or other accessory devices or functions shall be provided where shown on the drawings.

SPEC WRITER NOTE: Delete the paragraph below if not required by the project.

**2.4 SURGE PROTECTIVE DEVICES**

- A. Where shown on the drawings, furnish panelboards with integral surge protective devices. Refer to Section 26 43 13, SURGE PROTECTIVE DEVICES.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Installation shall be in accordance with the manufacturer's instructions, the NEC, as shown on the drawings, and as specified.
- B. Locate panelboards so that the present and future conduits can be conveniently connected.
- D. Install a printed schedule of circuits in each panelboard after approval by the COR//. Schedules shall reflect final load descriptions, room numbers, and room names connected to each circuit

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breaker. Schedules shall be printed on the panelboard directory cards and be installed in the appropriate panelboards

- E. Mount panelboards such that the maximum height of the top circuit breaker above the finished floor shall not exceed 1980 mm (78 inches).
- F. Provide blank cover for each unused circuit breaker mounting space.

- I. Panelboard enclosures shall not be used for conductors feeding through, spliced, or tapping off to other enclosures or devices.

**3.2 ACCEPTANCE CHECKS AND TESTS**

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

- 1. Visual Inspection and Tests:

- a. Compare equipment nameplate data with specifications and approved shop drawings.
- b. Inspect physical, electrical, and mechanical condition.
- c. Verify appropriate anchorage and required area clearances.
- d. Verify that circuit breaker sizes and types correspond to approved shop drawings.
- e. To verify tightness of accessible bolted electrical connections, use the calibrated torque-wrench method or perform thermographic survey after energization.
- f. Vacuum-clean enclosure interior. Clean enclosure exterior.

**3.3 FOLLOW-UP VERIFICATION**

- A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the panelboards are in good operating condition and properly performing the intended function.

---END---

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**SECTION 26 36 23**

**AUTOMATIC TRANSFER SWITCHES**

**PART 1 GENERAL**

**1.01 SCOPE**

- A. Furnish and install the low voltage automatic transfer switches having the ratings, features/accessories and enclosures as specified herein and as shown on the contract drawings.

**1.02 RELATED SECTIONS**

**1.03 REFERENCES**

- A. The automatic transfer switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL and NEMA as follows:
  - 1. UL 1008 - Transfer Switches
  - 2. UL 991 - Tests for Safety-Related Controls Employing Solid-State Devices
  - 3. NFPA 70 - National Electrical Code
  - 4. NFPA 99 - Essential Electrical Systems of Health Care Facilities
  - 5. NFPA 110 - Emergency and Standby Power Systems
  - 6. NEMA ICS 10 - AC Transfer Switch Equipment
  - 7. IEEE 446 - Recommended Practice for Emergency and Standby Power Systems

**1.04 SUBMITTALS - FOR REVIEW/APPROVAL**

- A. The following information shall be submitted to the Engineer:
  - 1. Front view and plan view of the assembly
  - 2. Schematic diagram
  - 3. Conduit space locations within the assembly.
  - 4. Assembly ratings including:
    - a. Withstand and Closing rating
    - b. Voltage
    - c. Continuous current rating
    - d. Short-Time rating if applicable
    - e. Short-circuit rating if ordered with integral protection

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5. Cable terminal sizes
  6. Product Data Sheets.
- B. Where applicable, the following additional information shall be submitted to the Engineer:
1. Busway connection
  2. Connection details between close-coupled assemblies
  3. Composite front view and plan view of close-coupled assemblies

**1.05 SUBMITTALS - FOR CONSTRUCTION**

- A. The following information shall be submitted for record purposes:
1. Final as-built drawings and information for items listed in section 1.04
  2. Wiring diagrams
  3. Certified production test reports
  4. Installation information
- B. The final (as-built) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

**1.06 QUALIFICATIONS**

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

**1.07 REGULATORY REQUIREMENTS**

- A. Provide a certificate of compliance with UL 1008 for the transfer switches furnished under this section.

**1.08 DELIVERY, STORAGE AND HANDLING**

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions.
- One (1) copy of these instructions shall be included with the equipment at time of shipment.

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**1.09 FIELD MEASUREMENTS**

**1.10 OPERATION AND MAINTENANCE MANUALS**

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped, and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

**1.11 EXTRA PRODUCTS(NOT USED)**

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Eaton
- B. \_ASCO\_\_\_\_\_
- C. \_RUSSELECTRIC\_\_\_\_\_
- D. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the engineer ten (10) days prior to bid date.

**2.02 CONSTRUCTION**

- A. Switches shall be free standing construction utilizing \*[draw-out] mounted power case switches or circuit breakers, Eaton type MAGNUM DS or approved equal.
- B. Ratings shall be per the drawing. All breakers shall be UL listed for application in their intended enclosures for 100% of their continuous ampere rating. Breakers shall be electrically operated.
- C. All breakers shall be provided with a true, two-step stored energy mechanism providing a maximum of three-cycle closing. All the energy required for closing the breakers shall be completely stored and held in readiness pending a release to close action. The power case switch or breaker shall have high-endurance characteristics being capable of no-load and full-load interruptions at rated current equal to or exceeding the UL endurance ratings for power circuit breakers without maintenance.

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- D. Transfer switches shall be closed transition and operate in a make before break fashion. The transfer switch logic will limit the source parallel time to less than 100ms. Closed transition transfer switches shall include a time delay utility parallel relay, external to the controller, to shunt trip the source 1 breaker in the event that the transfer switch remains closed on both sources for a period greater than .5-1 second. Closed transition transfer switches shall have the option to default to an open in-phase and/or delayed transition.
- E. The switching panel shall consist of completely enclosed contact assemblies and a separate control or transformer panel. Control power for all transfer operations shall be derived from the line side of the source to which the load is being transferred.
- F. Each transfer switch shall be positively interlocked both mechanically and electrically to prevent simultaneous closing of both sources under either automatic or manual operation. Main contacts shall be mechanically locked in position in both normal and emergency positions. A neutral position shall not be possible under normal electrical operation unless a delayed transition accessory is required for switching highly inductive loads.
- G. Transfer switches shall be capable of being operated manually under full rated load conditions. Manual operation shall be accomplished by a permanently attached manual operator, or by integrally mounted pushbuttons. Removable manual operating handles, and handles that may move in the event of an electrical operation during the manual operation, are not acceptable. Manual operators requiring source or load disconnection prior to manual operation are not acceptable.
- H. On transfer switches requiring a fourth pole for switching the neutral, the neutral shall be fully rated with equal withstand, closing and interrupting ratings to the power poles. Switched neutral poles which are add-on or overlap, or that are not capable of breaking full rated load current are not acceptable.
- I. The transfer switch shall have a multi-tap voltage selection plug for ease of voltage adjustment in the field.
- J. Where shown on the drawings, transfer switches applied as service entrance equipment, shall be provided with over-current trip units and a service entrance label. A key-operated selector switch shall be provided to disconnect the power supplies. Indicators shall be provided to show the availability of each source as well as breakers in a disconnected position. Provide a neutral disconnect link for three-pole solid neutral switches, and a neutral-to-ground main bonding jumper for all switches to meet UL service entrance requirements. Ground fault protection shall be provided



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for all switches rated 1000 amperes or more applied on 480Y/277 Vac systems in accordance with NEC Article 230-95 .

- K. Where indicated on the drawings, the transfer switches shall be provided with a draw-out mechanism to allow easy access for preventive maintenance, testing or inspection. The draw-out mechanism shall provide visual indicators as to the position of the switch/breaker during the draw-out operation.
- L. When the transfer switches shall be provided with a draw-out mechanism, shuttered cassettes should be provided for safety purposes
- M. When the transfer switches shall be provided with a draw-out mechanism and Nema 1 enclosure, a roof mounted breaker lifting device shall be included.

**2.03 BYPASS ISOLATION**

- A. A manual bypass isolation switch shall provide isolation of the source and load power conductors to the ATS. The bypass transfer switch shall have current, voltage, and withstand ratings equal to the interconnected automatic transfer switch. Transfer to bypass shall be a manually initiated no-load break type transfer.
- B. Positive mechanical interlocks shall be provided for bypass isolation switches to prevent cross connection of services.
- C. When provided, the automatic transfer switch and the bypass isolation switch sections shall be factory interconnected with copper bus.
- D. The bypass isolation transfer switches shall be provided with a draw-out mechanism to allow access for preventive maintenance, testing or inspection. The draw-out mechanism shall provide visual indicators as to the position of the switch/breaker during the draw-out operation.

**2.04 Microprocessor logic**

- A. The transfer switch shall be equal to an Eaton ATC-900 type microprocessor-based controller. The controller shall be hardened against potential problems from transients and surges. Operation of the transfer switch and monitoring of both sources shall be managed by the controller.
- B. The automatic transfer switch controllers shall meet or exceed the following standards in addition to the basic switch standards:
  - 1. IEC 61000-4-2 - EMC Testing and Measurement Techniques - Electrostatic Discharge Immunity Test
  - 2. IEC 61000-4-3 - EMC Testing and Measurement Techniques - Radio-frequency, Electromagnetic Field Immunity Test

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3. IEC 61000-4-4 - EMC Testing and Measurement Techniques - Electrical Fast Transient/Burst Immunity Test
4. IEC 61000-4-5 - EMC Testing and Measurement Techniques - Surge Immunity Test
5. IEC 61000-4-6 - EMC Testing and Measurement Techniques - Immunity to Conducted Disturbances, Induced by Radio-frequency Fields
6. IEC 61000-4-11 - EMC Testing and Measurement Techniques - Voltage Dips, Short Interrupts and Voltage Variations Immunity Tests
7. CISPR11, Class B - Industrial, Scientific and Medical Radio-frequency Equipment - Electromagnetic Disturbance Characteristics - Limits and Methods of Measurement
8. FCC Part 15, Subpart B, Class B

**2.05 ENCLOSURE**

- A. Each transfer switch shall be provided in a NEMA 1] enclosure suitable for use in environments indicated in the drawings.
- B. NEMA 1, 12 or 3R enclosures shall be painted with the manufacturer's standard light gray ANSI 61paint.

**2.06 CONTROLLER DISPLAY AND KEYPAD**

- A. The microprocessor-based controller display shall be UV resistant and include a 4.3 inch Color TFT (480x272), backlit display. The controller shall be capable of displaying transfer switch status, parameters, and diagnostic data. All set point parameters shall be password protected and programmable using the controller keypad, USB port, or remotely using serial port access. Limited abbreviations or codes shall be used for transfer switch functions.
- B. The microprocessor-based controller shall include a mimic bus display consisting of six (6) individual LED's (3mm) for indicating the following:
  1. Availability status of source 1
  2. Availability status of source 2
  3. Connection status of source 1
  4. Connection status of source 2
  5. Source 1 Preferred
  6. Source 2 Preferred

**2.07 VOLTAGE AND FREQUENCY SENSING**

- A. The controller shall have a voltage range of 0-790 volts (50/60 Hz) and an accuracy of +/- 1% of the reading and a frequency range of 40-70 Hz and an accuracy of +/- .3 Hz.

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- B. Voltage and frequency dropout and pickup parameters are set as a percentage of the nominal voltage as indicated in the table below.

Setpoint	Sources	Dropout	Pickup
Undervoltage	Source 1 and 2	70 - 97%	(DO + 2%) - 99%
Overvoltage	Source 1 and 2	105 - 110%	103% - (DO - 2%)
Underfrequency	Source 1 and 2	90 - 97%	(DO + 1Hz) - 99%
Overfrequency	Source 1 and 2	103 - 105%	101% - (DO - 1Hz)
Voltage Unbalance	Source 1 and 2	5 - 20%	(UNBAL DO% - 2) - 3%

- C. The normal and emergency sources shall include phase reversal protection. The preferred rotation is programmable as ABC or CBA.

**2.08 TIME DELAYS**

- A. A time delay shall be provided on transfer to source 2, adjustable from 0 to 166 minutes.
- B. A time delay shall be provided to override a momentary power outage or voltage fluctuation, adjustable from 0 to 120 seconds.
- C. A time delay shall be provided on retransfer from source 2 to source 1, adjustable from 0 to 166 minutes.
- D. A time delay shall be provided after retransfer that allows the generator to run unloaded prior to shutdown, adjustable from 0 to 166 minutes.
- E. A time delay shall be provided for engine failure to start, adjustable 0-60 seconds.
- F. ✕ A pre and or post transfer time delay output adjustable from 0-120 seconds. The contact shall be a form-c contact rated for 10-Amp at 250-Vac and 10-Amp at 30-Vdc.
- G. All delays shall be field adjustable from the microprocessor-based controller without the use of special tools.

**2.09 ADDITIONAL FEATURES**

- A. One Form C contact for closure of the source 1 generator start circuit for optional use with a dual generator system. The contacts shall be rated for 5-Amp at 250-Vac and 5-Amp at 30-Vdc.

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- B. One Form C contact for closure of the source 2 generator start circuit. The contacts shall be rated for 5-Amp at 250-Vac and 5-Amp at 30-Vdc.
- C. The controller shall include two independently programmable Engine Exercisers, selectable as disabled, 7, 14, or 28 day interval, or by calendar date. Run time shall be adjustable for 0-600 minutes, with or without load. Upon loss of source 2 power, the ATS shall automatically return to source 1. Transfer time delays shall also be independently programmable for test events.
- D. The controller shall include a keypad pushbutton to initiate a system test.
- E. The controller shall include 4 user configurable inputs. Each input provides 50 volts at 10ma and can be user configured to one of the following features:
  - 1. Input to accept a remote contact which closes to initiate a transfer to source 2. This feature shall be failsafe and an automatic retransfer shall occur in the event that source 2 power is lost.
  - 2. Input to accept a remote contact which closes to initiate a transfer to source 2. This feature shall be failsafe and an automatic retransfer shall occur in the event that source 2 power is lost.
  - 3. Input to accept a remote contact which opens to inhibit transfer to source 2.
  - 4. Input to enable monitor mode to disable automatic operation of the transfer switch while continuing to display status. Monitor mode allows set point programming at the controller display.
  - 5. Input to enable lockout feature to disable automatic operations of the transfer switch following an overcurrent trip of an integral circuit breaker.
  - 6. Input to enable or disable manual retransfer to source 1.
  - 7. Input to initiate manual retransfer to source 1.
  - 8. Input to initiate a remote engine test. The test will run using the programmed engine test set points.
  - 9. Input to select source 1 or source 2 as the preferred source.
  - 10. Input to initiate a remote load test.
  - 11. Input to indicate the bypass transfer switch is closed on a source.
  - 12. Input to bypass time delays
  - 13. Input to receive engine start signal from a master controller in a three source application.

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- F. The controller shall include 4 user configurable outputs rated for 10-Amp at 250-Vac and 10-Amp at 30-Vdc. Each input can be user configured to one of the following features:
- a. Source 1 connected
  - b. Source 2 connected
  - c. ATS in test
  - d. ATS not in automatic mode (Monitor Mode)
  - e. General Alarm indication for failure to transfer, mechanical fault, or electrical fault.
  - f. Engine Test Aborted
  - g. Engine cool down in process
  - h. Engine start contact status
  - i. Emergency inhibit on
  - j. Load sequence - Output used to signal select loads to disconnect prior to transfer and reconnect 0-120 seconds after. Loads are reconnected sequentially.
  - k. Selective load shed - Output used to shed low priority loads when the load reaches a programmed threshold value. A load shed and load restore set point (measured in kW) are associated with this feature.
  - l. Load bank control - Output to disconnect a load bank during an engine run test if a transfer to a source 2 generator is required.
  - m. Pre and/or post transfer signal - A pre and or post transfer time delay output adjustable from 0-120 seconds.
- G. One Form C auxiliary contact to indicate Source 1 position and one Form C contact to indicate source 2 position. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- H. One Form C contact for Source 1 Available. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- I. One Form C contact for Source 2 Available. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- J. Data Logging
- 1. Historical Data Storage to include:
    - a. Engine Run Time
    - b. Source 1 Available time
    - c. Source 2 Available time
    - d. Source 1 Connected time
    - e. Source 2 Connected time
    - f. Source 1 Engine Run Time
    - g. Source 2 Engine Run Time

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- h. Load Energized Time
- i. Number of Transfers
- 2. Event Summary shall include up to 100 date and time stamped events. All metered values are logged for each event. Event summaries include:
  - a. Transfer events
  - b. Alarms
  - c. Changes to the set points
  - d. Changes to the time/date
  - e. Resetting a historical counter
  - f. Engine Run test
- 3. Event Details shall include up to 350 date and time stamped events. All metered values are logged for each event. Event details include detailed sequence of operations of a transfer event.
- 4. Event recording shall capture 4 seconds of metered data, stored every 20 msec for certain events. The data is captured 2 seconds before and 2 seconds after the event. Oscillographic data for 10 events is stored and may be downloaded over USB. Events Include:
  - a. Source unavailability actions that initiate a transfer sequence (Undervoltage, Overvoltage, etc.)
  - b. Successful transfers (at the point of breaker/contactors closure)
  - c. Unsuccessful transfers (at the point of breaker/contactors failure to close or open)

**2.10 OPTIONAL ACCESSORIES**

- A. Non-Automatic Control: Provide a 2-Position Selector Switch, maintained contact, marked: "Automatic" and "Non-Automatic". The transfer switch shall be transferred by actuating a two position maintained selector switch labeled "Source 1" and "Source 2". A 30mm pilot light shall be provided labeled "Not in Automatic".
- B. Non-Automatic Control: Provide a 3-Position Selector Switch, maintained contact, marked: "Automatic" and "Non-Automatic". The transfer switch shall be transferred by actuating a three position maintained selector switch labeled "Source 1", "Off" and "Source 2". A 30mm pilot light shall be provided labeled "Not in Automatic".
- C. <sup>3</sup>Manual Retransfer Control: The ATS shall remain connected to the emergency source after the normal source becomes available until a momentary pushbutton contact closure signal is received to initiate the retransfer. Should a failure of the emergency source occur while waiting for the manual return, the re-transfer proceeds automatically.
- D. Device panel mounted Preferred Source Selector switch

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- E. Device panel mounted Source 2 Inhibit keyed switch with 30mm white pilot light indicating inhibit status.
- F. Device panel mounted selector switch to initiate a load transfer to source 1. This operation shall be failsafe to initiate an automatic retransfer upon loss of source 2 power.
- G. Communications Interface to be [Modbus 485] [Ethernet TCP/IP].
- H. Where indicated on the drawings, provide a [50KA] [80KA] [100KA] [200KA] surge protection device on source 1.
- I. Space heater with thermostat rated for 100 watts.
- J. Integrated Load Metering - The controller shall include integral load metering. When included, metered values shall be viewable from the controller LCD display.
- K. Source 1 Voltages (3Φ)
- L. Source 2 Voltages (3Φ)
- M. Load Voltages (3Φ)
- N. Source 1 Frequency
- O. Source 2 Frequency
- P. Load Frequency
- Q. Load Currents (3Φ)
- R. Load kW
- S. Load kVar
- T. Load kVA
- U. pF

**2.11 REMOTE ANNUNCIATOR AND CONTROLLER:**

- A. Monitor up to eight (8) automatic transfer switches.
  - 1. 7" touchscreen color display
  - 2. Mimic bus display for each transfer switch with indication of source availability, based on controller pickup and dropout settings, and switch position.
  - 3. Each mimic bus display shall be marked with the designation of the transfer switch monitored.
  - 4. Indication of switch in test mode,
  - 5. Indication of failure of digital communication link.
- B. Control Functions
  - 1. Control functions shall be password protected and shall include:
    - a. Initiate engine test.

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- b. Initiate a failsafe transfer to source 2.
- c. Initiate manual retransfer.
- C. Indicating Lights: Grouped for each transfer switch monitored.
- D. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.
- E. Mounting: Flush, modular, steel cabinet, unless otherwise indicated.
- F. Communications capability to be compatible with ATS controller.

**PART 3 ADDITIONAL REQUIREMENTS**

TABLE 16496A-1: UL 1008 Listed Withstand Ratings				
Ampere Rating	3 cycle rating			30 cycle rating
	240V (kA)	480V (kA)	600V (kA)	
Magnum				
800	100	100	100	85
1000	100	100	100	85
1200	100	100	100	85
1600	100	100	100	85
2000	100	100	100	85
2500	100	100	100	85
3200	100	100	100	85
4000A	100	100	100	85
5000A*	100	100	100	85

\* 5000A is UL 891 listed only.

**3.01 WITHSTAND AND CLOSING RATINGS**

- A. The transfer switch shall have a 3 cycle short circuit withstand and closing rating of 65\_\_\_\_KA at 480\_\_\_\_ volts.
- B. The transfer switch shall have a 30 cycle short time withstand and closing rating of \_\_65\_KA at \_480\_\_ volts.

**PART 4 EXECUTION**



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**4.01 EXAMINATION-( NOT USED)**

**4.02 FACTORY TESTING**

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.
  - 1. Insulation check to ensure the integrity of insulation and continuity of the entire system
  - 2. Visual inspection to ensure that the switch matches the specification requirements and to verify that the fit and finish meet quality standards
  - 3. Mechanical tests to verify that the switch's power sections are free of mechanical hindrances
  - 4. Electrical tests to verify the complete electrical operation of the switch and to set up time delays and voltage sensing settings of the logic
- B. The manufacturer shall provide a certified copy of factory test reports.
- C. Transfer switch shall include a label indicating order number, catalog number and date

**4.03 INSTALLATION**

- A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings
- B. All necessary hardware to secure the assembly in place shall be provided by the contractor

**4.04 FIELD QUALITY CONTROL**

- A. Provide the services of a qualified factory-trained manufacturer's representative to assist the contractor in installation and start-up of the equipment specified under this section for a period of working days. The manufacturer's representative shall provide technical direction and assistance to the contractor in general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained therein.

**4.05 MANUFACTURER'S CERTIFICATION**

- A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.

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- B. The Contractor shall provide a copy of the manufacturer's representative's certification.

**4.06 TRAINING**

- A. The [Contractor] OR [Manufacturer's qualified representative] shall conduct a training session for up to five (5) owner's representatives for 5\_\_normal workdays at a jobsite location determined by the owner. The training program shall consist of the instruction on the operation of the transfer switch and the major components within the assembly.

**4.07 FIELD SERVICE ORGANIZATION**

- A. The manufacturer of the ATS shall also have a national service organization that is available throughout the contiguous United States and is available on call 24 hours a day, 365 days a year.

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**SECTION 26 43 13**  
**SURGE PROTECTIVE DEVICES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, and connection of Type 2 Surge Protective Devices, as defined in NFPA 70, and indicated as transient voltage surge suppression or TVSS in this section.

**1.2 RELATED WORK**

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 24 13, DISTRIBUTION SWITCHBOARDS: For factory-installed or external TVSS.
- C. Section 26 24 16, PANELBOARDS: For factory-installed or external TVSS.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
  - 1. Shop Drawings:
    - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
    - b. Include electrical ratings and device nameplate data.
  - 2. Manuals:
    - a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering replacement parts.
    - b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
  - 3. Certifications: Two weeks prior to final inspection, submit the following.
    - a. Certification by the manufacturer that the TVSS conforms to the requirements of the drawings and specifications.

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- b. Certification by the Contractor that the TVSS has been properly installed.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below (including amendments, addenda, revisions, supplement and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. Institute of Engineering and Electronic Engineers (IEEE):
- IEEE C62.41.2-02.....Recommended Practice on Characterization of  
Surges in Low-Voltage (1000 V and Less) AC  
Power Circuits
- IEEE C62.45-03.....Recommended Practice on Surge Testing for  
Equipment Connected to Low-Voltage (1000 V and  
Less) AC Power Circuits
- C. National Fire Protection Association (NFPA):
- 70-11.....National Electrical Code (NEC)
- D. Underwriters Laboratories, Inc. (UL):
- UL 1283-05.....Electromagnetic Interference Filters
- UL 1449-06.....Surge Protective Devices

**PART 2 - PRODUCTS**

**2.1 SWITCHGEAR/SWITCHBOARD TVSS**

- A. General Requirements:
1. Comply with IEEE and UL.
  2. Modular design with field-replaceable modules, or non-modular design.
  3. Fuses, rated at 200 kA interrupting capacity.
  4. Bolted compression lugs for internal wiring.
  5. Integral disconnect switch.
  6. Redundant suppression circuits.
  7. LED indicator lights for power and protection status.
  8. Audible alarm, with silencing switch, to indicate when protection has failed.
  9. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.

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Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device.

10. Four-digit transient-event counter.

B. Surge Current per Phase: Minimum 240kA per phase.

**2.2 PANELBOARD TVSS**

A. General Requirements:

1. Comply with UL 1449 and IEEE C62.41.2.
2. Modular design with field-replaceable modules, or non-modular design.
3. Fuses, rated at 200 kA interrupting capacity.
4. Bolted compression lugs for internal wiring.
5. Integral disconnect switch.
6. Redundant suppression circuits.
7. LED indicator lights for power and protection status.
8. Audible alarm, with silencing switch, to indicate when protection has failed.
9. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.  
Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device.
10. Four-digit transient-event counter.

B. Surge Current per Phase: Minimum 120kA per phase.

**2.3 ENCLOSURES**

A. Enclosures: NEMA 1

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Factory-installed TVSS: Switchgear, switchboard, or panelboard manufacturer shall install TVSS at the factory.
- B. Field-installed TVSS: Contractor shall install TVSS with conductors or buses between TVSS and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.
  1. Provide a circuit breaker as a dedicated disconnecting means for TVSS as shown on drawings.

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- C. Do not perform insulation resistance tests on switchgear, switchboards, panelboards, or feeders with the TVSS connected. Disconnect TVSS before conducting insulation resistance tests, and reconnect TVSS immediately after insulation resistance tests are complete.

**3.2 ACCEPTANCE CHECKS AND TESTS**

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests:

- a. Compare equipment nameplate data with specifications and approved shop drawings.
- b. Inspect physical, electrical, and mechanical condition.
- c. Verify that disconnecting means and feeder size and maximum length to TVSS corresponds to approved shop drawings.
- d. Verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method.
- e. Vacuum-clean enclosure interior. Clean enclosure exterior.
- f. Verify the correct operation of all sensing devices, alarms, and indicating devices.

**3.3 FOLLOW-UP VERIFICATION**

- A. After completion of acceptance checks and tests, the Contractor shall show by demonstration in service that TVSS are in good operating condition and properly performing the intended function.

**3.4 INSTRUCTION**

- A. Provide the services of a factory-trained technician for one 2-hour training period for instructing personnel in the maintenance and operation of the TVSS, on the date requested by the COR.

---END---

# **DIVISION 32**

## **EXTERIOR IMPROVEMENTS**





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**SECTION 32 05 23**  
**CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section shall cover site work concrete constructed upon the prepared subgrade and in conformance with the lines, grades, thickness, and cross sections shown on the Drawings. Construction shall include the following:
- B. Equipment Pads: transformers generator pads.

**1.2 RELATED WORK**

- A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- B. Section 01 45 29, TESTING LABORATORY SERVICES.
- C. Section 03 30 53, CAST-IN-PLACE CONCRETE.
- D. Section 05 50 00, METAL FABRICATIONS.
- E. Section 31 20 11, EARTHWORK.

**1.3 DESIGN REQUIREMENTS**

- A. Design all elements with the latest published version of applicable codes.

**1.4 WEATHER LIMITATIONS**

- A. Hot Weather: Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete. Methods proposed for cooling materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by COR.
- B. Cold Weather: Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by COR.

**1.5 SELECT SUBBASE MATERIAL JOB-MIX**

The Contractor shall retain a testing laboratory to design a select subbase material mixture and submit a job-mix formula to the COR, in writing, for approval. The formula shall include the source of materials, gradation, plasticity index, liquid limit, and laboratory compaction curves indicating maximum density at optimum moisture. Cost

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of the testing laboratory to be included in the Contractor's cost of project.

**1.6 SUBMITTALS**

Contractor shall submit the following.

A. Manufacturers' Certificates and Data certifying that the following materials conform to the requirements specified.

1. Expansion joint filler
2. Hot poured sealing compound
3. Reinforcement
4. Curing materials

B. Jointing Plan for all concrete areas.

C. Concrete Mix Design.

D. Concrete Test Reports

E. Construction Staking Notes from Surveyor.

F. Data and Test Reports: Select subbase material.

1. Job-mix formula.
2. Source, gradation, liquid limit, plasticity index, percentage of wear, and other tests as specified and in referenced publications.

**1.7 APPLICABLE PUBLICATIONS**

The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Refer to the latest edition of all referenced Standards and codes.

A. American Association of State Highway and Transportation Officials (AASHTO):

M147-65-UL.....Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses (R 2004)

M148-05-UL.....Liquid Membrane-Forming Compounds for Curing Concrete (ASTM C309)

M171-05-UL.....Sheet Materials for Curing Concrete (ASTM C171)

M182-05-UL.....Burlap Cloth Made from Jute or Kenaf and Cotton Mats

B. American Society for Testing and Materials (ASTM):

A82/A82M-07.....Standard Specification for Steel Wire, Plain, for Concrete Reinforcement

A185/185M-07.....Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

A615/A615M-12.....Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

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A653/A653M-11.....Standard Specification for Steel Sheet, Zinc  
Coated (Galvanized) or Zinc Iron Alloy Coated  
(Galvannealed) by the Hot Dip Process

A706/A706M-09b.....Standard Specification for Low Alloy Steel  
Deformed and Plain Bars for Concrete  
Reinforcement

A767/A767M-09.....Standard Specification for Zinc Coated  
(Galvanized) Steel Bars for Concrete  
Reinforcement

A775/A775M-07b.....Standard Specification for Epoxy Coated  
Reinforcing Steel Bars

A820/A820M-11.....Standard Specification for Steel Fibers for  
Fiber Reinforced Concrete

C31/C31M-10.....Standard Practice for Making and Curing Concrete  
Test Specimens in the field

C33/C33M-11a.....Standard Specification for Concrete Aggregates

C39/C39M-12.....Standard Test Method for Compressive Strength of  
Cylindrical Concrete Specimens

C94/C94M-12.....Standard Specification for Ready Mixed Concrete

C143/C143M-10a.....Standard Test Method for Slump of Hydraulic  
Cement Concrete

C150/C150M-12.....Standard Specification for Portland Cement

C171-07.....Standard Specification for Sheet Materials for  
Curing Concrete

C172/C172M-10.....Standard Practice for Sampling Freshly Mixed  
Concrete

C173/C173M-10b.....Standard Test Method for Air Content of Freshly  
Mixed Concrete by the Volumetric Method

C192/C192M-07.....Standard Practice for Making and Curing Concrete  
Test Specimens in the Laboratory

C231/C231M-10.....Standard Test Method for Air Content of Freshly  
Mixed Concrete by the Pressure Method

C260/C260M-10a.....Standard Specification for Air Entraining  
Admixtures for Concrete

C309-11.....Standard Specification for Liquid Membrane  
Forming Compounds for Curing Concrete

C494/C494M-12.....Standard Specification for Chemical Admixtures  
for Concrete

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C618-12.....Standard Specification for Coal Fly Ash and Raw  
or Calcined Natural Pozzolan for Use in Concrete  
C666/C666M-03(2008).....Standard Test Method for Resistance of Concrete  
to Rapid Freezing and Thawing  
D1751-04(2008).....Standard Specification for Preformed Expansion  
Joint Filler for Concrete Paving and Structural  
Construction (Non-extruding and Resilient  
Bituminous Types)  
D4263-83(2012).....Standard Test Method for Indicating Moisture in  
Concrete by the Plastic Sheet Method.  
D4397-10.....Standard Specification for Polyethylene Sheeting  
for Construction, Industrial and Agricultural  
Applications

C. American Welding Society (AWS):

D1.4/D1.4M (2005).....Structural Welding Code - Reinforcing Steel

**PART 2 - PRODUCTS**

**2.1 GENERAL**

A. Concrete Type: Concrete shall be as per Table 1 - Concrete Type, air entrained.

TABLE I - CONCRETE TYPE

	Concrete Strength		Non-Air- Entrained	Air-Entrained	
	Min. 28 Day Comp. Str. Psi (MPa)	Min. Cement lbs/c. yd (kg/m <sup>3</sup> )	Max. Water Cement Ratio	Min. Cement lbs/c. yd (kg/m <sup>3</sup> )	Max. Water Cement Ratio
Type A	5000 (35) <sup>1,3</sup>	630 (375)	0.45	650 (385)	0.40
Type B	4000 (30) <sup>1,3</sup>	550 (325)	0.55	570 (340)	0.50
Type C	3000 (25) <sup>1,3</sup>	470 (280)	0.65	490 (290)	0.55
Type D	3000 (25) <sup>1,2</sup>	500 (300)	*	520 (310)	*

1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 1200 psi (8.3 MPa) in excess of the compressed strength. For concrete strengths above 5000 psi (35 Mpa), the proposed mix design shall achieve a compressive strength 1400 psi (9.7 MPa) in excess of the compressed strength.
2. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.

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3. Determined by Laboratory in accordance with ACI 211.1 for normal concrete or ACI 211.2 for lightweight structural concrete.

B. Maximum Slump: Maximum slump, as determined by ASTM C143 with tolerances as established by ASTM C94, for concrete to be vibrated shall be as shown in Table II.

TABLE II - MAXIMUM SLUMP - INCHES (MM)

TYPE	MAXIMUM SLUMP*
Curb & Gutter	3 inches (75 mm)
Pedestrian Pavement	3 inches (75 mm)
Vehicular Pavement	2 inches (50 mm) (Machine Finished) 4 inches (100 mm) (Hand Finished)
Equipment Pad	3 to 4 inches (75 to 100 mm)
* For concrete to be vibrated: Slump as determined by ASTM C143. Tolerances as established by ASTM C94.	

**2.2 REINFORCEMENT**

A. The type, amount, and locations of steel reinforcement shall be as shown on the drawings and in the specifications.

**2.3 SELECT SUBBASE (WHERE REQUIRED)**

A. Subbase material shall consist of select granular material composed of sand, sand-gravel, crushed stone, crushed or granulated slag, with or without soil binder, or combinations of these materials conforming to AASHTO M147, as follows.

GRADE REQUIREMENTS FOR SOILS USED AS SUBBASE MATERIALS,  
BASE COURSES AND SURFACES COURSES

AASHTO M147		Percentage Passing by Mass					
Sieve	Size	Grades					
(mm)	(in)	A	B	C	D	E	F
50	2	100	100				
25	1		75-95	100	100	100	100
9.5	3/8	30-65	40-75	50-85	60-100		
4.47	No. 4	25-55	30-60	35-65	50-85	55-100	70-100
2.00	No. 10	15-40	20-45	25-50	40-70	40-100	55-100
0.425	No. 40	8-20	15-30	15-30	25-45	20-50	30-70
0.075	No. 200	2-8	5-20	5-15	5-20	6-20	8-25

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- B. Materials meeting other gradations than that noted will be acceptable whenever the gradations are within a tolerance of three to five percent, plus or minus, of the single gradation established by the job-mix formula, or as recommended by the geotechnical engineer and approved by the COR.
- C. Subbase material shall produce a compacted, dense-graded course, meeting the density requirement specified herein.

**2.4 FORMS**

- A. Use metal or wood forms that are straight and suitable in cross-section, depth, and strength to resist springing during depositing and consolidating the concrete, for the work involved.
- B. Do not use forms if they vary from a straight line more than 1/8 inch (3 mm) in any ten foot (3000 mm) long section, in either a horizontal or vertical direction.
- C. Wood forms should be at least 2 inches (50 mm) thick (nominal). Wood forms shall also be free from warp, twist, loose knots, splits, or other defects. Use approved flexible or curved forms for forming radii.

**2.5 CONCRETE CURING MATERIALS**

- A. Concrete curing materials shall conform to one of the following:
  - 1. Burlap having a weight of seven ounces (233 grams) or more per yard (square meter) when dry.
  - 2. Impervious Sheeting conforming to ASTM C171.
  - 3. Liquid Membrane Curing Compound conforming to ASTM C309, Type 1 and shall be free of paraffin or petroleum.

**2.6 EXPANSION JOINT FILLERS**

- A. Material shall conform to ASTM D1751-04.

**PART 3 - EXECUTION**

**3.1 SUBGRADE PENETRATION**

- A. Prepare, construct, and finish the subgrade as specified in Section 31 20 11, EARTHWORK.
- B. Maintain the subgrade in a smooth, compacted condition, in conformance with the required section and established grade until the succeeding operation has been accomplished.

**3.2 SELECT SUBBASE (WHERE REQUIRED) NOT USED**

**3.3 SETTING FORMS**

- A. Base Support:

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1. Compact the base material under the forms true to grade so that, when set, they will be uniformly supported for their entire length at the grade as shown.
2. Correct imperfections or variations in the base material grade by cutting or filling and compacting.

**B. Form Setting:**

1. Set forms sufficiently in advance of the placing of the concrete to permit the performance and approval of all operations required with and adjacent to the form lines.
2. Set forms to true line and grade and use stakes, clamps, spreaders, and braces to hold them rigidly in place so that the forms and joints are free from play or movement in any direction.
3. Forms shall conform to line and grade with an allowable tolerance of 1/8 inch (3 mm) when checked with a straightedge and shall not deviate from true line by more than 1/4 inch (6 mm) at any point.
4. Do not remove forms until removal will not result in damaged concrete or at such time to facilitate finishing.
5. Clean and oil forms each time they are used.
6. Make necessary corrections to forms immediately before placing concrete.
7. When any form has been disturbed or any subgrade or subbase has become unstable, reset and recheck the form before placing concrete.

- C. The Contractor's Registered Professional Land Surveyor shall establish the control, alignment and the grade elevations of the forms or concrete slipforming machine operations. Staking notes shall be submitted for approval to the COR prior to placement of concrete. If discrepancies exist between the field conditions and the Drawings, Contractor shall notify COR immediately. No placement of concrete shall occur if a discrepancy greater than 1 inch (25 mm) is discovered.

**3.4 EQUIPMENT**

- A. The COR shall approve equipment and tools necessary for handling materials and performing all parts of the work prior to commencement of work.
- B. Maintain equipment and tools in satisfactory working condition at all times.

**3.5 PLACING REINFORCEMENT**

- A. Reinforcement shall be free from dirt, oil, rust, scale or other substances that prevent the bonding of the concrete to the

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reinforcement. All reinforcement shall be supported for proper placement within the concrete section.

- B. Before the concrete is placed, the COR shall approve the reinforcement placement, which shall be accurately and securely fastened in place with suitable supports and ties. The type, amount, and position of the reinforcement shall be as shown on the Drawings.

**3.6 PLACING CONCRETE - GENERAL**

- A. Obtain approval of the COR before placing concrete.
- B. Remove debris and other foreign material from between the forms before placing concrete.
- C. Before the concrete is placed, uniformly moisten the subgrade, base, or subbase appropriately, avoiding puddles of water.
- D. Convey concrete from mixer to final place of deposit by a method which will prevent segregation or loss of ingredients. Deposit concrete so that it requires as little handling as possible.
- E. While being placed, spade or vibrate and compact the concrete with suitable tools to prevent the formation of voids or honeycomb pockets. Vibrate concrete well against forms and along joints. Over-vibration or manipulation causing segregation will not be permitted. Place concrete continuously between joints without bulkheads.
- F. Install a construction joint whenever the placing of concrete is suspended for more than 30 minutes and at the end of each day's work.
- G. Workmen or construction equipment coated with foreign material shall not be permitted to walk or operate in the concrete during placement and finishing operations.
- H. Cracked or Chipped Concrete Surfaces and Bird Baths. Cracked or chipped concrete and bird baths will not be allowed. Concrete with cracks or chips and bird baths will be removed and replaced to the nearest joints, and as approved by the COR, by the Contractor with no additional cost to the Government.

**3.7 PLACING CONCRETE FOR CURB AND GUTTER, PEDESTRIAN PAVEMENT, AND EQUIPMENT PADS - NOT USED**

**3.8 PLACING CONCRETE FOR VEHICULAR PAVEMENT- NOT USED**

**3.9 CONCRETE FINISHING - GENERAL**

- A. The sequence of operations, unless otherwise indicated, shall be as follows:
  - 1. Consolidating, floating, straight-edging, troweling, texturing, and edging of joints.



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2. Maintain finishing equipment and tools in a clean and approved condition.

**3.10 CONCRETE FINISHING CURB AND GUTTER- not used**

**3.11 CONCRETE FINISHING PEDESTRIAN PAVEMENT- not used**

**3.12 CONCRETE FINISHING FOR VEHICULAR PAVEMENT- not used**

**3.13 CONCRETE FINISHING EQUIPMENT PADS**

- A. After the surface has been struck off and screeded to the proper elevation, provide a smooth dense float finish, free from depressions or irregularities.
- B. Carefully finish all slab edges with an edger having a radius as shown in the Drawings.
- C. After removing the forms, rub the faces of the pad with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The finish surface of the pad shall not vary more than 1/8 inch (3 mm) when tested with a 10 foot (3000 mm) straightedge.
- D. Correct irregularities exceeding the above. See Article 3.6, Paragraph H, above.

**3.14 JOINTS - GENERAL**

- A. Place joints, where shown on the Shop Drawings and Drawings, conforming to the details as shown, and perpendicular to the finished grade of the concrete surface.
- B. Joints shall be straight and continuous from edge to edge of the pavement.

**3.15 CONTRACTION JOINTS**

- A. Cut joints to depth as shown with a grooving tool or jointer of a radius as shown or by sawing with a blade producing the required width and depth.
- B. Construct joints in curbs and gutters by inserting 1/8 inch (3 mm) steel plates conforming to the cross sections of the curb and gutter.
- C. Plates shall remain in place until concrete has set sufficiently to hold its shape and shall then be removed.
- D. Finish edges of all joints with an edging tool having the radius as shown.
- E. Score pedestrian pavement with a standard grooving tool or jointer.

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**3.16 EXPANSION JOINTS- NOT USED**

**3.17 CONSTRUCTION JOINTS- NOT USED**

**3.18 FORM REMOVAL**

- A. Forms shall remain in place at least 12 hours after the concrete has been placed. Remove forms without injuring the concrete.
- B. Do not use bars or heavy tools against the concrete in removing the forms. Promptly repair any concrete found defective after form removal.

**3.19 CURING OF CONCRETE**

- A. Cure concrete by one of the following methods appropriate to the weather conditions and local construction practices, against loss of moisture, and rapid temperature changes for at least seven days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready to install before actual concrete placement begins. Provide protection as necessary to prevent cracking of the pavement due to temperature changes during the curing period. If any selected method of curing does not afford the proper curing and protection against concrete cracking, remove and replace the damaged pavement and employ another method of curing as directed by the COR.
- B. Burlap Mat: Provide a minimum of two layers kept saturated with water for the curing period. Mats shall overlap each other at least 150 mm (6 inches).
- C. Impervious Sheeting: Use waterproof paper, polyethylene-coated burlap, or polyethylene sheeting. Polyethylene shall be at least 4 mils (0.1 mm) in thickness. Wet the entire exposed concrete surface with a fine spray of water and then cover with the sheeting material. Sheets shall overlap each other at least 12 inches (300 mm). Securely anchor sheeting.
- D. Liquid Membrane Curing:
  - 1. Apply pigmented membrane-forming curing compound in two coats at right angles to each other at a rate of 200 square feet per gallon (5 m<sup>2</sup>/L) for both coats.
  - 2. Do not allow the concrete to dry before the application of the membrane.
  - 3. Cure joints designated to be sealed by inserting moistened paper or fiber rope or covering with waterproof paper prior to application of the curing compound, in a manner to prevent the curing compound entering the joint.

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4. Immediately re-spray any area covered with curing compound and damaged during the curing period.

**3.20 CLEANING**

- A. After completion of the curing period:
  1. Remove the curing material (other than liquid membrane).
  2. Sweep the concrete clean.
  3. After removal of all foreign matter from the joints, seal joints as specified.
  4. Clean the entire concrete of all debris and construction equipment as soon as curing and sealing of joints has been completed.

**3.21 PROTECTION**

- A. The contractor shall protect the concrete against all damage prior to final acceptance by the Government. Remove concrete containing excessive cracking, fractures, spalling, or other defects and reconstruct the entire section between regularly scheduled joints, when directed by the COR, and at no additional cost to the Government. Exclude traffic from vehicular pavement until the concrete is at least seven days old, or for a longer period of time if so directed by the COR.

**3.22 FINAL CLEAN-UP**

- A. Remove all debris, rubbish and excess material from the Station.

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